Australian Personal Computer VOL. 21 NO. 4 APRIL 2000

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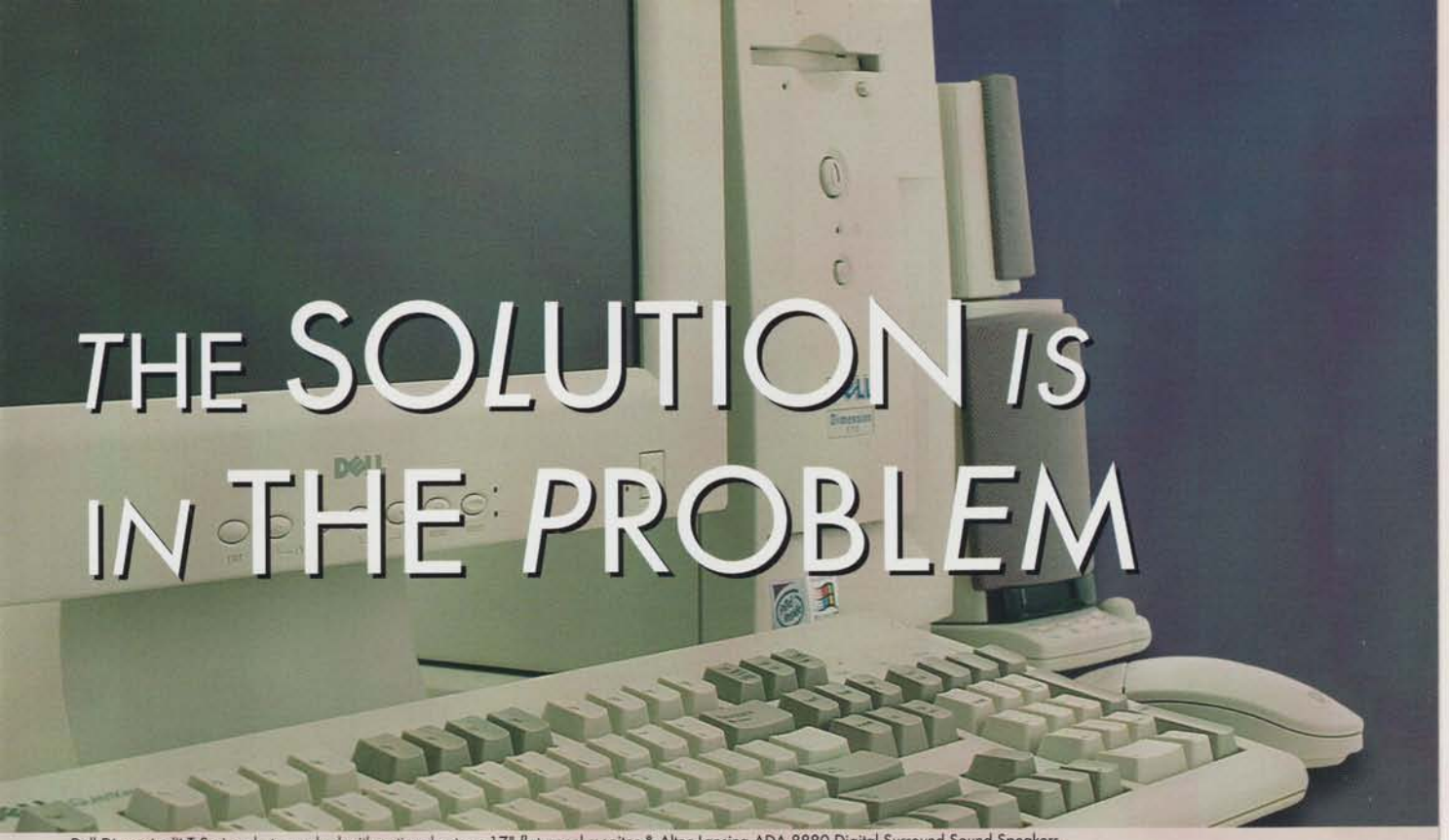
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THE SOLUTION IS IN THE PROBLEM

Dell Dimension™ T Series photographed with optional extras: 17" flat panel monitor & Altec Lansing ADA 8880 Digital Surround Sound Speakers.

Every Dell computer is designed to solve a business problem. Your business has specific needs and by identifying these Dell can build computers perfectly suited to your business.

The Dell Dimension range of PC's is already the solution to literally thousands of businesses - why not yours? You can custom configure your PC with the latest Intel® Pentium® III processors (up to 800MHz), cutting edge RDRAM technology, expand your storage capacity to a massive 37GB[1] Hard Drive and upgrade to the breakthrough 4 X AGP graphics card.

Get Dell to put together the perfect solution for all your business needs.



Dell Dimension™ L Series
Photographed with optional 17" flat panel monitor

DELL DIMENSION™ XPS B600R DESKTOP

- Intel® Pentium® III Processor 600EB MHz
- Mini Tower Model
- 256KB On-Die L2 Cache
- 128MB RDRAM
- 10GB[1] Ultra ATA Hard Drive (7200rpm)
- 3.5" 1.44MB Diskette Drive
- 3Com® Etherlink® 10/100 PCI NIC for Complete PC Management
- 32MB NVIDIA TNT2 M64 4X AGP Graphics Card
- 48X Max Variable CD-ROM Drive
- 15" Colour Monitor (13.7" v.i.s.)
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 2000
- Norton Anti-Virus 2000
- Dell QuietKey Keyboard
- Microsoft® Intellimouse®
- Telstra Big Pond Business ISP Offer
- 3 Year Limited Warranty (with 3 year Second Business Day on-site Service)[4]
- **Free Lifetime Telephone Technical Support[2]**

$2,899* plus delivery. $26 per week** E•VALUE CODE 220316-470303

Dell recommended upgrade options:
- Expand storage capacity with 27GB[1] Hard Drive $240
- Get ready for GST with QuickBooks Pro V6 $295

DELL DIMENSION™ XPS T600R DESKTOP

- Intel® Pentium® III Processor 600EMHz
- Mini Tower Model
- 256KB On-die L2 Cache
- 64MB 100MHz SDRAM
- 10GB[1] Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- 3Com® Etherlink® 10/100 PCI NIC for Complete PC Management
- 16MB ATI RAGE 128 Pro 2X AGP Graphics Card
- 48X Max Variable CD-ROM Drive
- 15" Colour Monitor (13.7" v.i.s.)
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 2000
- Dell QuietKey Keyboard
- Microsoft® Intellimouse®
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- Telstra Big Pond Business ISP Offer
- 3 Year Limited Warranty (with 3 year Second Business Day on-site Service)[4]
- **Free Lifetime Telephone Technical Support[2]**

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Dell recommended upgrade options:
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DELL DIMENSION™ L550R DESKTOP

- Intel® Pentium® III Processor 550EMHz
- Micro Tower Model
- 256KB Advance Transfer L2 Cache
- 64MB 100MHz SDRAM
- 4.3GB[1] Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- Integrated Direct AGP 4MB Dynamic Video Memory
- 48X Max Variable CD-ROM Drive
- 15" Colour Monitor (13.7" v.i.s.)
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 2000
- Dell QuietKey Keyboard
- Microsoft® Intellimouse®
- Telstra Big Pond Business ISP Offer
- Norton Anti-Virus 2000
- 3 Year Limited Warranty
- **Free Lifetime Telephone Technical Support[2]**

$1,899* plus delivery. $17 per week** E•VALUE CODE 220310A-470303

Dell recommended upgrade options:
- Get ready for GST with QuickBooks Pro V6 $295
- Add sound to your business system by adding SoundBlaster Live! Sound Card $93 and Harmon Kardon Speakers for $150

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DELD0221/APC/FRONT

HOW WOULD YOU DESIGN YOUR PERFECT OFFICE PARTNER

All Dell computers are configured to order, engineered to suit your business needs – perfectly. At Dell it's all about made-to-order technology – solutions that suit you.



Dell Dimension™ T Series[8] photographed with options: 17" flat panel monitor and Altec Lansing ADA 880 speakers.

1. PERSONALISED SYSTEMS

As well as solving specific business needs Dell's custom configured computers mean that you get exactly what you need and you don't have to pay for anything you don't.

To find out just how easy it is to put together your perfect business partner visit us online at **www.dell.com.au** and build systems using the custom configurator – it's easy and it's interesting. Then all you have to do is click "add to cart" or call us and we'll put together your system for you – all software is also configured to your specifications.

2. KNOW-HOW

Dell was built on listening to our customer's requirements and then fulfilling those needs. You see, it's our business to listen to you and understand exactly what your business requires.

Our experienced sales force are expertly equipped in dealing with the needs of small and expanding businesses. Every Dell staff member that you will speak to has all the know-how about the latest and most appropriate technology for your business. So, whether you need to network an office with servers, PC's and notebooks or configure a workstation to breeze through the most challenging video applications – Dell staff are here with the answers.

3. AWARD WINNING, TAILORED SUPPORT

Readers of Australian Personal Computer voted Dell #1 for Serivce and Reliability in the annual awards[5] and all Dell support packages are tailored to your needs. So the personalised treatment you enjoyed whilst purchasing your new Dell computer extends into our after sales service. All Dell systems come with Free Lifetime Technical Support or you can choose the level of support you want – such as upgrading to a three year onsite warranty.

Now, doesn't Dell sound like the perfect business partner!

DELL DIMENSION™ DESKTOPS

DELL DIMENSION™ XPS B800R DESKTOP

- Mini Tower Model
- Intel® Pentium® III Processor 800EB MHz
- 256KB Advance Transfer L2 Cache
- 128MB PC700 356MHz ECC RDRAM
- 20.4GB[1] Ultra ATA Hard Drive (7200rpm)
- 3.5" 1.44MB Diskette Drive
- 32MB NVIDIA geFORCE 4X AGP Graphics Card
- SoundBlaster Live! Value 576Voice Sound Card
- 8X Max Variable DVD-ROM Drive and Software Decoding
- Altec Lansing ACS-340 Speakers with Subwoofer
- 19" Trinitron Monitor (18.0" v.i.s.)
- Logitech 4-button MouseMan® Wheel (PS/2V)
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 2000
- Norton Anti-Virus 2000
- Conexant™ V.90/56K PCI Telephony Modem for Windows
- Microsoft® Natural® Keyboard Pro
- Telstra Big Pond Home ISP Offer
- PowerGame Pack II
- 3 Year Limited Warranty
- **Free Lifetime Telephone Technical Support[2]**

$4,999* plus delivery. $41 per week** E•VALUE CODE 210327P - 470303

FREE GRAPHICS UPGRADE PACK:
FREE upgrade to 64MB nVidia geForce Plus 4X AGP DDR Graphics Card
Valid until 17 April, 2000.

DELL DIMENSION™ XPS T600R DESKTOP

- Intel® Pentium® III Processor 600EMHz
- Mini Tower Model
- 256KB Advance Transfer L2 Cache
- 64MB 100MHz SDRAM
- 10GB[1] Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- 32MB NVDIA TNT2 M64 2X AGP Graphics Card
- Turtle Beach Montego II 320 Voice PCI Sound Card
- 48X Max Variable CD-ROM Drive
- Harmon Kardon Stereo Speakers
- 17" Colour Monitor (15.9" v.i.s.)
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 2000
- Microsoft® Intellimouse®
- Norton Anti-Virus 2000
- Conexant™ V.90/56K PCI Telephony Modem for Windows
- Dell QuietKey Keyboard
- Telstra Big Pond Home ISP Offer
- PowerGame Pack II
- 3 Year Limited Warranty
- **Free Lifetime Telephone Technical Support[2]**

$2,699* plus delivery. $24 per week** E•VALUE CODE 210314P- 470303

FREE UPGRADE PACK:
FREE upgrade to 15GB[1] Ultra ATA Hard Drive
FREE upgrade to Microsoft® Natural® Pro Key Board, Dell Edition
Valid until 17 April 2000

DELLWARE





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$572

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DELL POWEREDGE™ 4400 SERVER

- Intel® Pentium® III Xeon™ Processor 667MHz (Dual Processor Capable)
- Rack-mount Capable Minitower (Midnight Grey)
- 256KB On-Die L2 Cache /133MHz FSB
- 128MB SDRAM With ECC (Upgradeable to 4GB[1])
- 9GB[1] Ultra160 SCSI Hard Drive (7200rpm)
- 3.5" 1.44MB Diskette Drive
- Integrated Intel Pro 100+ NIC
- Integrated UltraU160 SCSI Controller
- Integrated Dual Channel RAID Controller
- 40X Max Variable SCSI CD-ROM Drive
- Dell Mouse
- Standard Openview Network Node Manager S.E.
- 3 Year Limited Warranty (With 1 Year Next Business Day On-Site Service)[4]
- **Free Lifetime Telephone Technical Support**[2]

$8,699* $65 per week**
E•VALUE CODE 420346-470303
plus delivery.

FREE Additional Intel® Pentium® III XEON™ processor 667MHz.
Offer valid until 31st March 2000.

DELL POWEREDGE™ 1300 SERVER

- Intel® Pentium® III Processor 550MHz (Dual Processor Capable)
- Minitower (Midnight Grey)
- 512KB Internal L2 Cache
- 64MB 100MHz SDRAM With ECC (Upgradeable to 1GB[1])
- 9GB[1] LVD SCSI Hard Drive (7200rpm)
- 3.5" 1.44MB Diskette Drive
- Standard Intel Pro 100+ NIC
- Integrated Ultra2/LVD SCSI Controller
- 40X Max Variable EIDE CD-ROM Drive
- Dell Mouse
- Standard Openview Network Node Manager S.E.
- 3 Year Limited Warranty (With 1 Year Next Business Day On-Site Service)[4]
- **Free Lifetime Telephone Technical Support**[2]

$2,999* $25 per week**
E•VALUE CODE 420316 - 470303
plus delivery.

Dell recommended upgrade options:
- Add extra processing power with an additional Intel® Pentium® III Processor 450MHz $646
- Expand storage capacity with and additional 9GB[1] Hard Drive $738

DELL PRECISION™ WORKSTATION 420

- Intel Pentium® III Processor 533MHz/133 FSB
- Mini Tower Model
- Intel® 840 AGPset – Dual Processor Capable
- 256KB Integrated Full Speed Cache
- 128MB PC800 400MHz RDRAM with ECC
- 6.4GB[1] Ultra ATA-66 Hard Drive (5,400rpm)
- 3.5" 1.44MB Diskette Drive
- Integrated 3Com Fast Etherlink XL (3C920) – 10/100 Base-TX
- Integrated Ultra 160/M SCSI Controller
- Integrated Dual ATA-66 EIDE Controller
- 32MB Matrox G400 Max 4X AGP Graphics Card
- Integrated 16-Bit Sound
- 48X Max Variable EIDE CD-ROM Drive
- 17" Colour Monitor (15.9" v.i.s)
- Microsoft® Intellimouse®
- Microsoft® Windows NT® 4.0 (with FREE Microsoft Windows 2000 Upgrade Voucher)
- 3 Year Limited Warranty (with 3 Year Next Business Day On-Site Service)[4]
- **Free Lifetime Telephone Technical Support**[2]

$5,249* $40 per week**
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plus delivery.



Dell Inspiron™ 5000

DELL INSPIRON™ NOTEBOOKS

DELL INSPIRON™ 5000 R650VT NOTEBOOK

- Mobile Intel® Pentium® III Processor 650MHz with Intel® Speedstep™ Technology
- 256KB On-Die L2 Cache
- 128MB 100MHz SDRAM
- 12GB[1] Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- 3Com® 10/100 LAN CardBus PC Card
- 8MB ATI RAGE Mobility™-P 2X AGP Video Controller
- High-fidelity Audio SoundBlaster Compatible
- 24X Max Variable CD-ROM Drive
- 15" Hi-Res SXGA TFT Display (1400x1050).
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 99
- Deluxe Carrying Case
- 1 Year Limited Warranty (With International Coverage)[3]
- **Free Lifetime Telephone Technical Support**[2]

$6,329* $59 per week**
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plus delivery.

Dell recommended upgrade options:
- Extend the time you can be on the road, add a second battery $184
- Get ready for GST with Quick Books Pro $295

DELL INSPIRON™ 5000 R500GT NOTEBOOK

- Intel® Pentium® III Processor 500MHz
- 256KB On-Die L2 Cache
- 64MB 100MHz SDRAM
- 12GB[1] Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- 3Com® 10/100 LAN CardBus PC Card
- 8MB ATI RAGE Mobility™ - P 2X AGP Video Controller
- High-fidelity Audio SoundBlaster Compatible
- 24X Max Variable CD-ROM Drive
- 14.1" XGA Colour TFT Diplay
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 99
- Deluxe Carrying Case
- 1 Year Limited Warranty (With International Coverage)[3]
- **Free Lifetime Telephone Technical Support**[2]

$4,999* $43 per week**
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plus delivery.

Dell recommended upgrade options:
- Get ready for GST with Quick Books Pro $295
- Back up valuable data with an Iomega Clik!™ PC Card Drive with on Clik!™ Disk $364

DELL INSPIRON™ 3800 C500GT NOTEBOOK

- Intel® Celeron™ Processor 500MHz
- On-Die 128KB L2 Cache
- 32MB SDRAM
- 4.8GB[1] Ultra ATA Hard Drive
- 8MB ATI Mobility M1™ 2X AGP Video Controller
- 3.5" 1.44MB Diskette Drive
- High-fidelity Audio SoundBlaster Compatible
- 24X Max Variable CD-ROM Drive
- 12.1" XGA Colour TFT Display
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 2000
- 1 Year Limited Warranty (With International Coverage)[3]
- **Free Lifetime Telephone Technical Support**[2]

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The Dell Inspiron™ 3800 is a fully featured notebook perfect for the road, lightweight with a price to match. Or you can choose the Dell Inspiron™ 7500, a powerful desktop replacement notebook. The Dell Inspiron™ 7500 delivers incredible processing power, stunning 2D and 3D graphics on amazing 15" and 15.4" displays, and incredible hard drive expansion capacity of 75GB[1].

Alternatively, there's the NEW Dell Inspiron™ 5000, offering a 14" or 15" display, incredible processing power and expandability, weighing just 3.06kg. This makes the Inspiron™ 5000 a perfect blend of high performance, versatility and convenience.

And remember, all Dell Inspiron™ notebooks come with an option to extend the warranty to 3 years international coverage – so you'll have peace of mind wherever you are. So, carry your business into tomorrow. Talk to Dell today.



Dell Inspiron™ 3800
Available in Tahoe Blue, Sierra Marone, Forest Green and Storm Grey.

DELL INSPIRON™ 7500 R650YT NOTEBOOK

- Mobile Intel® Pentium® III Processor 650MHz with Intel® Speedstep™ Technology
- 256KB On-Die L2 Cache
- 256MB (2x128) 100MHz SDRAM
- 18GB[1] Ultra ATA Hard Drive
- RealPort CardBus Ethernet 10/100 & Modem 56 (32Bit)
- 8MB ATI RAGE Mobility™ - P 2X AGP Video Controller
- High-fidelity Audio SoundBlaster Compatible
- 24X Max Variable CD-ROM Drive with 3.5" 1.44MB Diskette drive modular Drive (Modular Combo)
- 15.4" SXGA Colour TFT Diplay
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 99
- Leather Carrying Case
- 1 Year Limited Warranty (With International Coverage)[3]
- **Free Lifetime Telephone Technical Support[2]**

$8,279* plus delivery. $70 per week**
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Dell recommended upgrade options:
- Get ready for GST with Quick Books Pro $295
- Add an Advance Port Replicator to connect to your network more quickly $498

DELL INSPIRON™ 5000 R600GT NOTEBOOK

- Mobile Intel® Pentium® III Processor 600MHz with Intel® Speedstep™ Technology
- 256KB On-Die L2 Cache
- 64MB 100MHz SDRAM
- 12GB[1] Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- RealPort CardBus Ethernet 10/100 & Modem 56 (32 Bit)
- 8MB ATI RAGE Mobility™ -P 2X AGP Video Controller
- High-fidelity Audio SoundBlaster Compatible
- 24X Max Variable CD-ROM Drive
- 14.1" XGA Colour TFT Display
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 99
- Deluxe Carrying Case
- 1 Year Limited Warranty (With International Coverage)[3]
- **Free Lifetime Telephone Technical Support[2]**

$5,549* plus delivery. $50 per week**
E•VALUE CODE 520330-470303

Dell recommended upgrade options:
- Back up your Business files with Iomega Zip 100MB Modular Drive $227
- Get ready for GST with Quick Books Pro $295

DELL INSPIRON™ 3800 R500GT NOTEBOOK

- Mobile Intel® Pentium® III Processor 500MHz
- On-Die 256KB L2 Cache
- 64MB 100MHz SDRAM
- 6.0GB[1] Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- 3Com® 10/100 LAN CardBus PC Card
- 8MB ATI Mobility M1™ 2X AGP Video Controller
- High-fidelity Audio SoundBlaster Compatible
- 24X Max Variable CD-ROM Drive
- 14.1" XGA Colour TFT Diplay
- Microsoft® Windows® 98 Second Edition
- Microsoft® OEM Works Suite 99
- Deluxe Carrying Case
- 1 Year Limited Warranty (With International Coverage)[3]
- **Free Lifetime Telephone Technical Support[2]**

$4,529* plus delivery. $36 per week**
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Dell recommended upgrade options:
- Get ready for GST with Quick Books Pro $295
- Bring a printer with you, add the HP340 portable printer for $490

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NVIDIA Vanta 8MB
4.3GB[4] Hard Drive (5400rpm)[5]
40X CD-ROM Drive[1]
Creative SoundBlaster AudioPCI 128V
Creative Labs SBS52 Speakers
Compaq Enhanced Keyboard
Microsoft® Windows® 98 Second Edition
Microsoft® Word 2000
Compaq PCI V90 modem
S500 Colour Monitor
3 year warranty[3]

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40X CD-ROM Drive[1]
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Microsoft® Windows® 2000 Professional
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S500 Colour Monitor
3 year warranty[3]

Intel® Pentium® III Processor 550EMHz - $2195

Prosignia 330 Desktop from $2795*

or $25.90 per week[2]

Intel® Pentium® III Processor 600EMHz

64MB, 100MHz, SDRAM
NVIDIA TNT2 M64 32MB
13.5GB[4] Ultra ATA Hard Drive (8.5ms/7200rpm)[5]
40X CD-ROM Drive[1]
Creative SoundBlaster AudioPCI 128V
Compaq Fast Ethernet 10/100
Compaq Enhanced Keyboard
Microsoft® Windows® 98 Second Edition
Microsoft® Office 2000 SBE
S700 Colour Monitor
3 year warranty[3]

Prosignia 330 Desktop from $2995*

or $27.75 per week[2]

Intel® Pentium® III Processor 650MHz

64MB, 100MHz, SDRAM
NVIDIA TNT2 M64 32MB
20GB[4] Ultra ATA Hard Drive (7200rpm)[5]
Internal DVD-ROM (10x/40x)
Creative SoundBlaster AudioPCI 128V
Compaq Fast Ethernet 10/100 NIC
Compaq Enhanced Keyboard
Microsoft® Windows® 98 Second Edition
Microsoft® Office 2000 SBE
S700 Colour Monitor
3 year warranty[3]

Intel® Pentium® III Processor 700EMHz - $3195

CarePaq Service Options

Hardware Service - Warranty extension for years 2 & 3
Prosignia Notebooks - $320
Prosignia Desktops - $280

NeoServer Hardware Installation - $275

Desktop Telephone Software Support - $240
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EDITOR'S NOTE



They surf, they vote

This month in *APC*, we review a good cross-section of major local Internet service providers. Naturally, things have changed since our last ISP review in the November 1999 issue of *APC*, including the ownership of trailblazer OzEmail. Curiously, this development indicates market consolidation among big ISPs, rather than small concerns being subsumed by bigger players, as was expected by some.

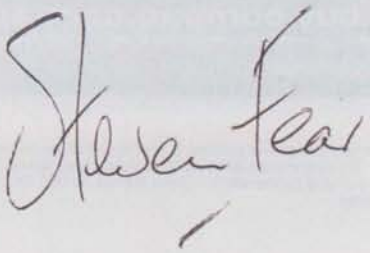
Anyway, the ISPs of Australia continue to compete for the business of an increasingly demanding public, and the difficulty for potential customers continues to be sorting through all the blurbs to work out which ISP can actually deliver an acceptable service for an acceptable price.

ISPs are a bit like mobile telephone carriers. Both have pricing plans that can be difficult to compare quickly and easily, both have a significant amount of 'churn', and while the carriers can confuse comparisons by variations in their network coverage, ISPs can (for the uninitiated at least) achieve the same result by harping on about the number and location of their POPs.

As ever, the irony is that while ISPs will spend a lot of time diligently working out pricing and conditions that are perhaps difficult to compare with those of other ISPs, potential customers spend a lot of time trying to unravel the plans and make them directly comparable. Hopefully, this month's *APC* can save you some work in this regard.

Although the ISPs reviewed this month have POPs in at least Sydney, Melbourne and Brisbane, we're still mindful of Internet users in other cities or in the bush — *especially* those in the bush. Unfortunately, it's impossible for us to properly compare test results for ISPs that don't have a POP in Sydney.

Many of these ISPs do a great job for Internet users in remote areas of Australia, but connection at local call prices and/or acceptable speeds are still major issues. We could squawk 'blame the government' again, but the Federal Government is by now well aware of the limitations of the existing telecommunications network in remote regions, and hopefully those in power are doing whatever is required to improve the Internet experience for remote users. After all, those people surf, and they vote.



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PC REVIEWS

Performance anxiety

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When *APC* last looked at PCs in December 1999, the fastest machines available ran at 600 to 650MHz. In just a few months, these machines have been left in the dust. *APC* Labs puts the new speed demons to the test to see if they are good value.

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BROADBAND: SPECIAL REPORT

Cable Internet: Is it worth it?



After years of delays, both Optus and Telstra are now offering unlimited access broadband Net access via their cable networks. In an exclusive head to head, *APC* tests the services and asks whether or not they live up to the hype.

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ISP REVIEWS

Everywhere you turn, ISPs are merging, folding and being bought out. There's more competition than ever before, so it's crucial to make the right choice. *APC* tests ISP connections and presents you with a guide to seeking bargains and avoiding rip-offs.

ISPs in this review:

AAPT Smartchat Internet
AOL
CompuServe Pacific
ConnectNet
DIALix
dingo blue
Hotkey
ihug
Lexicon Internet Services
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Subscription combo deal

Subscribe to *APC* and receive two free Pocketbooks of your choice. See page 96 for details of this amazing offer.



FEATURES

INFORMATION APPLIANCES



Manufacturers of new gaming consoles and Web devices are hoping that attention to consumers and easy Net access will equip them for a major assault on PC manufacturers. *APC* takes a look at the new contenders and asks whether supplementing rather than replacing the PC is the answer.

BROWSERS



The rise of XML means that the browser wars are on again. As the long-awaited Mozilla from Netscape/AOL gears up for public release, Microsoft may well find itself fighting a different kind of war to the familiar bipartisan battle of attrition. *APC* investigates what the latest release browsers offer and what the big two have in store.



Last month, *APC* showed you some of the best products for capturing video. This month, you'll be taken through the best software for editing your video.

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XHTML promises to bring some of the benefits of XML to existing sites without requiring enormous amounts of recoding. *APC* examines the new standard and explains how you should be using it on your Web site.

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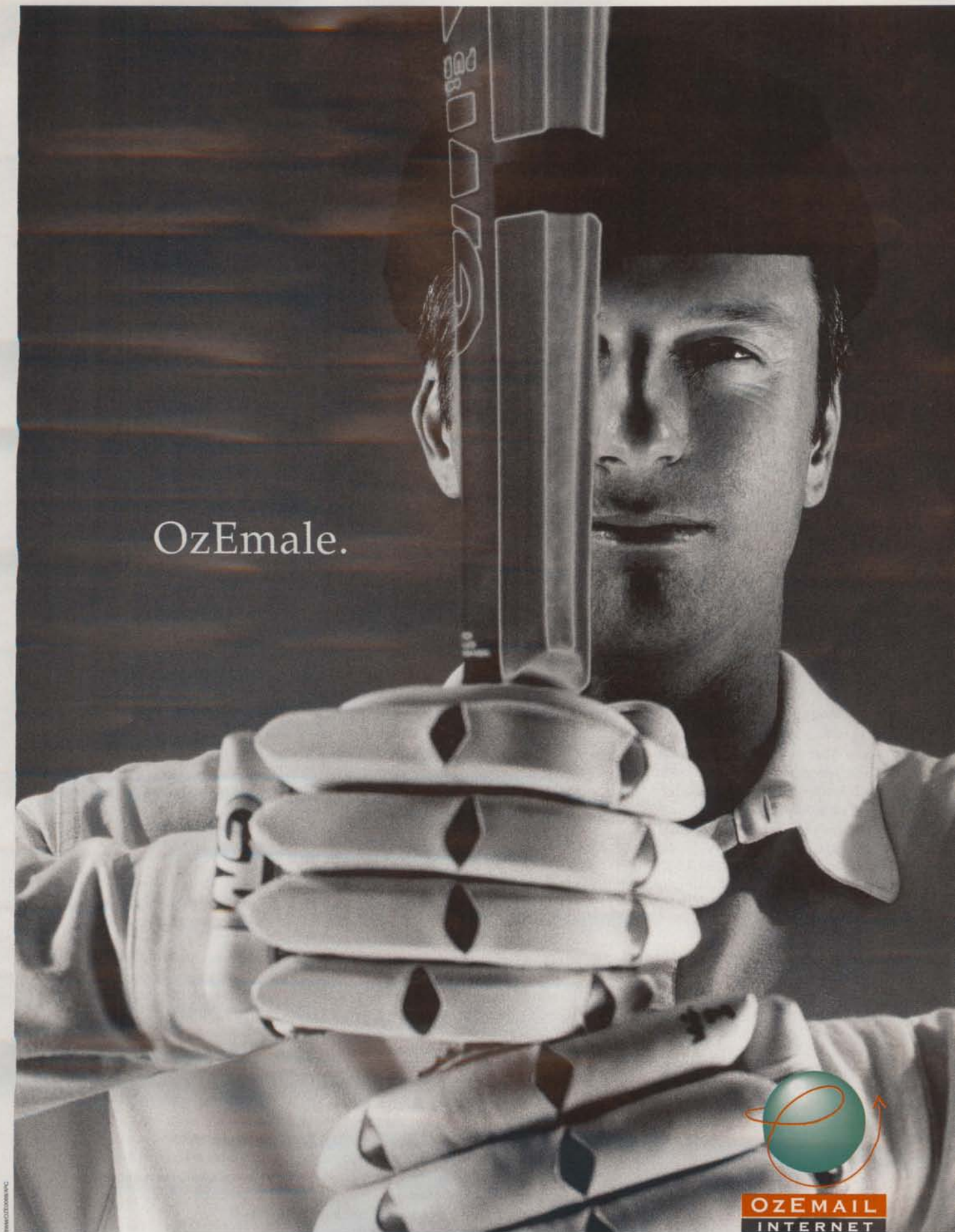
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Your guide to the cover CDs

apcmag.cd complements both the magazine and **apcmag.com**. Each month's disc collection features software related to articles in that issue, as well as special CD-only features and the latest Web browsers, OS patches and popular tools.



Each piece of software includes instructions on whether you will need to unzip the file before installing it, and most also include README files. A complete list of software included on this month's discs is included below.

All you need to use **apcmag.cd** has been created in HTML. You do not need any special software to access the discs, other than a standard browser. The CDs have been tested using Netscape Navigator 3.0 and 4.0, and Microsoft Internet Explorer 3.0 and 4.0.

All software on the CDs is provided as is, without any warranty, express or implied. Complete terms and conditions are included on the CD itself; click on the Conditions of Use link for details.

How to run the CDs

Before using the CDs, please read the Conditions of Use online at **apcmag.com/apcmag.cd.** These CDs use an Autorun feature for Windows 95, 98 and NT systems. Just insert **apcmag.cd** and your browser will automatically load with the **apcmag.cd** front page. Users of other platforms can simply launch their favourite browser and load the file DEFAULT.HTM in the root directory of the CD. For further information, see the instructions on the back cover of the CD cover.

You should carefully read the licensing agreements and honour any evaluation or shareware terms specified, read all instructions and README files, and virus-check every program before use.

While *APC* has taken every care to ensure that the software provided is useful and that it works, we cannot accept responsibility or liability for any of the products included.

What's on the CDs

Disc 1

WINDOWS

Acid WAV 2.1, All My MP3s 1.4, Arles Image Web Page Creator 3.1, Business Card Designer Plus, CGWebMonitor, DVD Profiler 0.9.7, Fund Manager 4.5, HyCD Play&Record 3.1.0120, Iron Key 1.0, MpegRepair 1.57, NetSpider 1.22, Paragon CD Emulator 2000, PicViewer 2.51, PingStar 2.0, PolyView 3.33, quickSkin 1.2, Sicyon 1.7, Skimpy 1.04, SuRest 1.0, System Mechanic 3.2d

MAC

AOL Instant Messenger 3.5.898, Apple Mac OS 9 Audio Update1.3, Archive 4.2, CDFinder 2.7.1, Chronos 2.0, Consultant 3.0.2, Image Extractor 3.0, Mac OS Runtime for Java 2.2, MacTuner 2.1.4, MathBasic 2.0, Meshwork 1.6.1, *OptimaHTML PPC* 2.0, PageSpinner 2.1, PlayerPRO 5.5, Program Switcher 5.01, SolarCell Photoshop Plugin 1.1f, StartMeUp 1.0, textSOAP 2.6, The Associator 2.0, Valentina PPC 1.7.52, Where Did All My Money Go? 1.6.3

LINUX

BASHISH DR5.1, Bastille Linux 1.0.3, dagrab 0.3.5, FreeAmp 2.0.3, gAcc 0.6.7, GDancer 0.1.10, Gnofin 0.7.7, gnotepad+ 1.2.0pre5, gShield 1.5.1, IceWM 1.0.2, Licq 0.76, Linux 2.3.46, MOffy 0.1.2, NeoMail 0.52, Nessus 0.99.5, Pingus 0.3.1, SFS 0.5, Sharity 2.3, tinyproxy 1.3.2, wmpalm 0.11b

WINDOWS CE

FIS WinCE Suite, CCZip 1.0, Resco Keyboard 2.0, Microsoft Plus Pack for HPC 3.0, Bubblet 1.0.1

PSION

nICQ 1.20, Castle III 1.01, NotePlan 1.0, DCP 4.1b, Solun 4.5

PALMPILOT

Palm Desktop 3.0.3, Tank Pilot 1.04 , pedit 1.08, DiddleBug 2.15, Launcher III 1.5.2

SCREENSAVERS

3-D Dolphin, 3-D Dancing Skeleton, 4D Cube 1.0, Age of Dinosaurs 3D 3.5, Blaze, Butterflies of North America 1.0, Charlie Brown 1.0, Corkboard, DestroyPokemon, Dopefish 2000, The Hypnogenic Screen Saver, Mountain Hummingbirds, Screen Saver Builder, SETI@home, The Movie Vault 2.0

GAMEZONE

Age of Wonders, Spec Ops II: US Army Green Berets, Spirit of Speed 1937

WORKSHOP

Windows: Ready to Print Organizer 3.55, Post-it Software Notes 2.0.2.46, Above & Beyond 2000, Calendar Maker 2.02

Mac: Greg's Browser 2.6.1, CopyPaste 4.4, TechTool 1.1.9, Prestissimo 1.5.1, FinderPop 1.8.4

Linux: Quake III Arena, Unreal Tournament, Civilization: Call to Power, Myth II: SoulBlighter, StarCraft (and WINE)

OS/2: PMView 2000, Albatros Media Player 2.0b6, QuickMotion 2.0, aMixer 1.9a, SOX (SOund eXchange) 12.15

BROWSERS

Microsoft Internet Explorer 5.01, Netscape Communicator 4.72, Netscape Navigator 4.08

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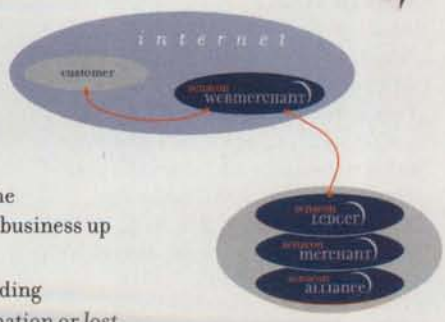
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Disc 2

INTERNET SUPERKIT

ARCHIVING TOOLS

Aladdin DropZip 5.0, DiskSpan 3.12, PowerArchiver 5.01, Self-Extractor Archive Recovery 2.0, WinImp 1.1, WinZip for Windows (16-bit), WinZip for Windows (32-bit), WinZip Internet Browser Support Add-On (16-bit), WinZip Internet Browser Support Add-On (32-bit), Zip Sender, ZipMan 99 Deluxe 1.00

EMAIL

1on1Lite 4.3.1, ActiveNames 5.1.11, Becky Internet Mail 1.25.04 , Cyber-Info E-Mail Notify 4.77, Eudora 4.3, Internet Email Forward 1.05.03, MailStudio 2.0, PowerMail 3.0 Beta 5, The Bat 1.39

GENERAL TOOLS

1stSource 1.0, 4-Net, Adobe Acrobat Reader 4.05, AutoURLSubmit, Disconnector 2.6, EntryPoint 1.0, GetRight 4.1.2, GoZilla Free 3.5, Internet Junkbuster 2.0.2-6, MacHeadlines Lite, nmh 1.0.3, Weather1

MULTIMEDIA

Emotion 3D: Web Edition 1.0, GifClean32 2.6d, iPrism 2.1.51, MP3.com Beam-it 2.0 Beta, Napster 2.0 Beta 5, NetSketch 2.32, pro motion 4.0.1, RadioSpy 1.0, RenderSoft VRML Editor 1.7, SHOUTcast server 1.01, Winamp 2.60, Windows Media On-Demand Producer 1.0pr

SERVER TOOLS

AnalogX SimpleServer:WWW 1.02, Apache Web Server 1.3.9, ArGoSoft FTP Server 1.0, CyberKit 2.5, FileCenter 1.1, IP Tools 2000 1.0, MConnect 1.0, Microsoft Windows NT 4.0 Resource Kit Support Tools SP4, Stress-Test 1.0, Toolkit for *Apache Web Server 2.0*, Ts 3, West Wind Web Monitor 1.50, Wircd 2000 2.0, XMail 0.12

TWEAKING TOOLS

AnalogX MaxMem 1.00, Dr.Salman's WinBooster, Memory-Trax II, MemTurbo 1.5, OptiX 2.0, TestCPU 0.94, Triage 2.1.0.4, WhatFormat 2.1, Win386 Cleaner 1.0, WinTune 98 1.0.41

Penguin's playtime

Linux game highlights from disc 1

Quake III Arena

id Software has long been the champion of 3D games. This cutting-edge 3D game pits you against highly intelligent, artificial robots and other human players in a multiplayer, arena-style tournament. The levels are detailed and unusual, and the computer-controlled players have unique personalities, abilities and appearances.



OS Linux
Online http://www.quake3arena.com/

Unreal Tournament

Epic's 3D shooter might not be quite as visually stunning as its id Software counterpart, but it more than makes up for this in gameplay. Levels are large and expansive, and in addition to vanilla deathmatch and 'capture the flag' modes, Unreal Tournament provides group mission levels and other unique features.



OS Linux
Online http://www.unrealtounament.net

Myth II: SoulBlighter

Myth II combines a very elegant 3D engine with the real time strategy games you have come to love. Steeped in the surrounds of medieval fantasy, you control armies of mythical creatures that battle against the evil SoulBlighter in glorious Mesa 3D. The game can be played in single-player mode or against others over a network. Swords and sorcery at their finest.

OS Linux
Online http://www.lokigames.com/



NETWORKING UTILITIES

ALIVE, Attacker 2.1, CyberCop Monitor 2.0,CyberCop Scanner 5.5, CyberKit 2.5,ipPulse 1.20, NeoTrace 2.12a, Net.Medic 1.2.2,NetScanTools 4.02, PCS DNS Utility Suite 3.6, PingStar 2.0, Ser_Ip 2.0, SwitchIP Pro 2.0, VisualRoute 4.2a, Whois 1.05

WEB DEVELOPMENT TOOLS

Adobe PageMill 3.0, Claris Home Page 3.0, Cool Page 2.0, Form Maker 1.5, HotDog PageWiz 1.0, HoTMetaL PRO 6.0.3.141, HTML Form Processing 1.5.2, IMS Web Dwarf 1.00, Symantec Visual Page 2.0

XHTML TOOLS

Mozquito Factory 1.2, HTML Tidy, XMetaL 1.2

BROWSERS

Microsoft Internet Explorer 5.01, Netscape Communicator 4.72, Netscape Navigator 4.08, CipherNet 1.0, NeoPlanet 5.1, NetCaptor 5.04, Netscape Navigator 3.04, Netscape Navigator 4.08, Opera 3.61, SuperSurf 2.5

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Disc 1

Gateway, Software Warehouse

Disc 2

AOL, Dingo Blue, OzEmail, Telstra Big Pond, TPG Internet

And the winner is...

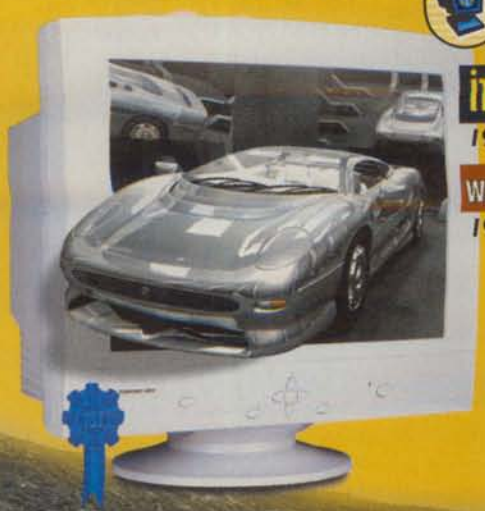
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Editor's Choice apcmag April '99

iTgraphics 1999 Awards

Windows 2000 1999 Awards



DIAMOND VIEW
DV180
18.1" Colour TFT Monitor



pc world best buys Dec '99.



PC WORLD BEST BUY April '99.

pc world Dec '99.

DIAMOND VIEW
1772e
17" Colour Monitor

DIAMOND VIEW
1570i
15" Colour Monitor



PC WORLD BEST BUY April '99.



Editor's Choice apcmag April '99

PC WORLD BEST BUY April '99.

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19" Colour Monitor

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http://newswire.com.au/

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Coming up

May 2000 marks 20 years of *APC*, and to celebrate we have a bumper issue, including a special lift-out book covering 20 years of computing history. A feature in print and **apcmag.cd** shows how you might recapture the joys of yesteryear using emulators.

In reviews, *APC* checks out voice recognition software — and instant messaging, the quiet revolution bucking to replace email as the Internet's killer app.

And what could be hotter than MP3s? May *APC* has a complete review of the best MP3 hardware available and the lowdown on MPEG-4 and 7. Finally, *APC* examines the progenitor of the post-PC era, the Internet appliance.

Conditions of entry

These conditions apply to all competitions in *APC* April, unless specific conditions are provided with the competition. Instructions on 'How to Enter' form part of the Conditions of Entry of all competitions in *APC* April. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Ltd (ACN 053 273 546), suppliers of competition prizes, their families and associated agencies. The contests close last mail April 18. Enter according to the instructions supplied with the individual competitions. The judges' decision is final and no correspondence will be entered into. No responsibility is accepted for late, lost or misdirected entries. All entries become the property of ACP Publishing Pty Limited, the promoter, 54 Park Street, Sydney, NSW 1028. The prizes are not transferable or redeemable for cash. Any change in the value of the prizes occurring between the publishing date and the date the prizes are claimed is not the responsibility of the promoter. Winners will be notified by security post and their names published in *APC* June.

Subscription promotion (page 96)

Information on how to enter form part of the terms and conditions of entry. Entry is open to all residents of Australia. Entry is open to all residents of Australia who subscribe to APC between 22/03/00 and 18/04/00. Entry is subject to a valid signature against a valid credit card or, if payment is made by cheque, the cheque must be cleared for payment. Subscriptions are to be sent to APC, Reply Paid 3357, Sydney, 2001; by phone 1800 252 515 (freecall Mon-Fri 08:30 – 20:00 EST, Sat 08:00 - 18:00 EST) or online at magshop.com.au on ninemsn Employees and their immediate families of the Promoter and its agencies associated with this promotion are ineligible to enter. Prizes cannot be transferred. The promoter and their associated agencies and companies shall not be liable for any loss or damage whatsoever (including but not limited to direct or consequential loss) or personal injury suffered or sustained by the prizes or in connection with any other prizes. They will take no responsibility for prizes damaged in transit.

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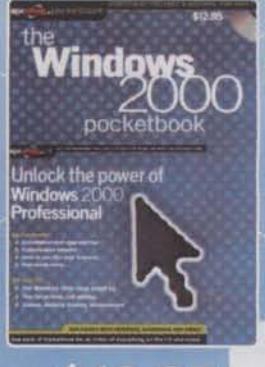
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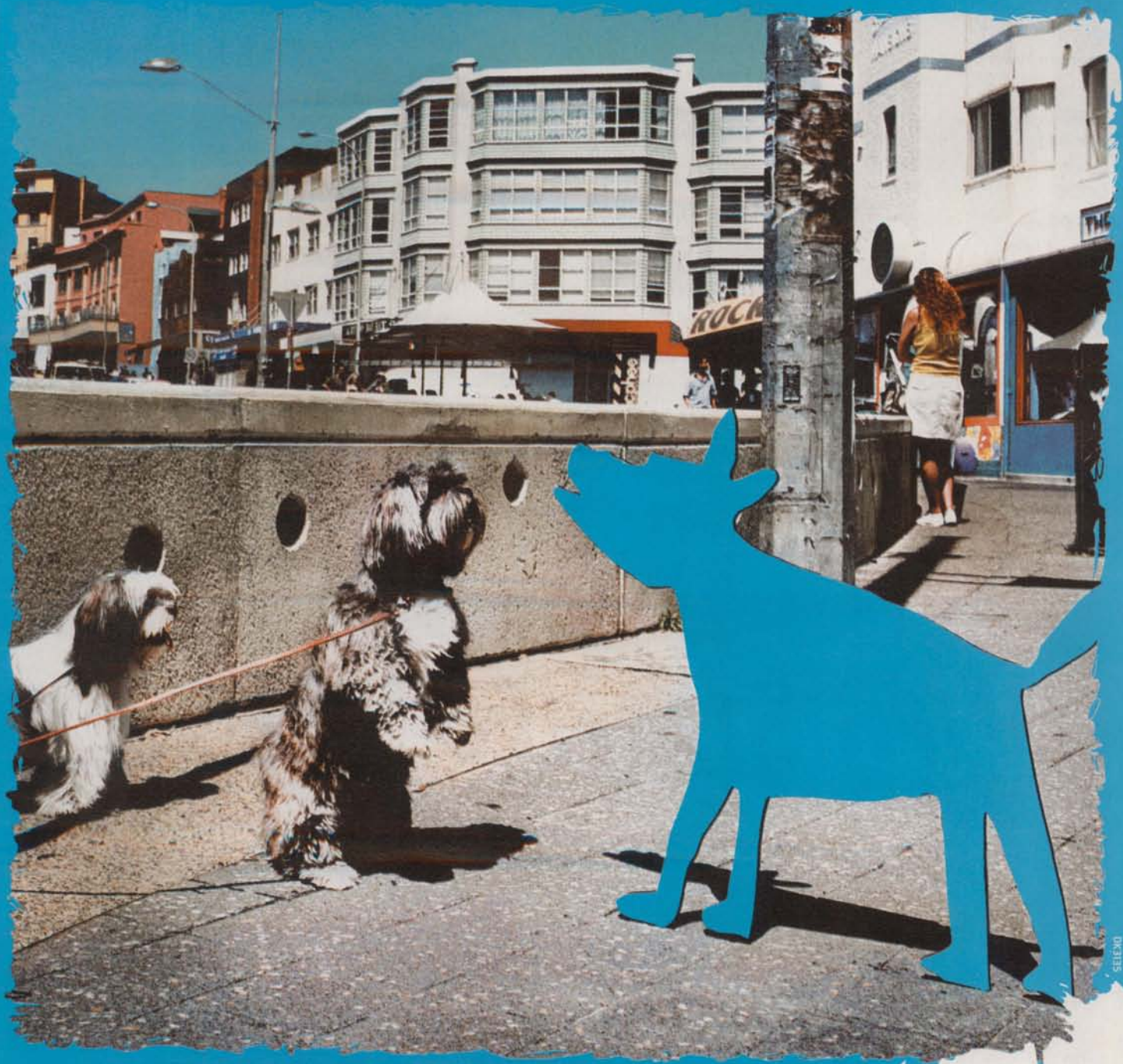
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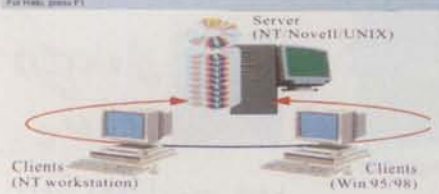
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ETAIL CONCERNS

Net shopping: On the cards?

Fearful of credit card fraud, many consumers avoid purchasing online. MasterCard aims to raise customer confidence by rating site security, but will shoppers get the message?

In an attempt to boost consumer confidence in using credit cards online, MasterCard has introduced a site security certification program named Shop Smart. Australia is the first country to adopt the scheme after the US.

Surveys suggest many Australian consumers avoid online shopping because they are still worried about the security of their credit card details on the Internet. Media reports about hackers, security breaches and fraud have contributed to an overall sense of nervousness about ordering online.

It's unlikely that customers really make their decision on whether or not to shop by looking at the encryption method involved, or whether the brand of credit card makes a real difference. However, a program such as Shop Smart puts a 'seal

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RESIGNATIONS, REJECTIONS AND RETURNS

Domain rulebook rewritten

Rules for allocating Internet addresses in Australia are likely to undergo radical change following a series of recent events.

A court case over an obscene domain name, turbulence in the body charged with rewriting the .com.au policy document and a recent victory by Telstra in claiming an international domain name have all increased the likelihood of a radically different policy being in place by the end of 2000.

Internet entrepreneur Mike Russell has lost an appeal to reclaim his fuck.com.au domain on a technicality. In January 1999, Russell successfully registered the domain with local registration body Internet Names Australia (INA), on behalf of local business Futurechicks. The name was withdrawn by INA three weeks later, citing an "implicit policy" that certain domain names are not registrable because of their offensive nature.

As this was not a stated condition of the domain name registration policy, Russell appealed the decision, which was heard before independent arbitrator Grant Holley.

The arbitrator stated that Clause 3.9, which relates to the registration of offensive names, was added after January 20, 1999, and was therefore irrelevant to the case. "It is unnecessary for me to consider whether there is a term implied into the policy preventing the registration of offensive words or whether the registration of such a word would be contrary to public policy," he wrote.

Instead, the arbitrator ruled that the name 'Futurechicks' was not closely aligned with the name fuck.com.au, "nor is there a distinct correlation between the word 'fuck' and the name 'Futurechicks'". The policy only states that the domain name be derived from the business name.

Russell said the arbitrator's interpretation of the policy gives INA wider scope for refusing domain names. "INA has a new set of rules which it can apply willy-nilly," he told *APC*. "They now have a new power."

Those rules are set for revision later this year by the .au Domain Registration (auDA), but that body is having problems of its own. Less than

Continued on page 18

Domain developments

Recent incidents which have contributed to a growing change in domain allocation rules in Australia include:



- The rejection of a domain name on the grounds that it doesn't represent a reasonable derivation of a business name
- The unexpected resignation of auDA's CEO after just six weeks in the job
- Telstra's successful use of the World Intellectual Property Organisation to reclaim the telstra.org domain

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AUSTRALIA'S TECHNOLOGY NEWS

Net shopping: On the cards?

Continued from page 17

of approval' from a recognised brand on the transaction. Visa has an equivalent program called 'Shop with Visa'.

Local Internet research company www.consult estimates that 598,000 Australian Internet users purchased something online during the 1999 Christmas shopping season, nearly four times the number recorded last year. They bought gifts worth an estimated $149 million. The most popular product categories were books, music, computers, computer games, toys, wine, hampers and flowers.

Sites selling these goods feature prominently among MasterCard's initial set of Shop Smart merchants. The credit card company's stated aim is to encourage merchants to adopt the SET (Secure Electronic Transactions) protocol, a highly secure certificate-based transaction system it developed with Visa in 1996. However, merchants have been slow to adopt the cumbersome and complex SET and most still use SSL (Secure Sockets Layer), which encrypts HTTP sessions to hide crucial data at the point of sale.

Principal of www.consult, Ramin Marzbani, said security in online shopping is still a big issue, but the effect of consumer confidence schemes is minimal.

"It makes some difference but it's not that significant. If the prices in the store are too high for example, it doesn't really matter what you say, people will still not shop there.





It's not that big a deal in the overall scheme of things."

Shop owners recognise that it's a big step for shoppers to make the move online. Managing director of online alcohol retailer Liquorlink, Luke Mahony, said security is still a stumbling block for many potential customers. "I think it's a major scare for anyone, especially first-time users," he said. "But I think on the technical side it's not as big a worry as people perceive it to be."

Alan Rogers, director of Australian Flourish, which provides goods and services to the florist industry and runs an online flower ordering site called Flowers on the Net, said he often finds himself educating customers on the realities of Web security.

"They mostly need to be reassured that their credit card details are going to be safe," he said. "That's what they're most concerned about. Once they've been reassured that that is the case, I think nine times out of 10 they feel safe ordering."

Some suggest that Australian consumers are unwilling to shop at locally run sites because overseas sites are much bigger and have better operations, but Marzbani does not agree.

"Australian online shops are getting a lot better," he said. "The satisfaction levels with purchases from Australian shops are pretty high. You've got to stop looking for the next Amazon.com and look at the next corner shop."

Simon Vandore

Domain rulebook rewritten

Continued from page 17

a month into his reign as the head of Australia's new Internet industry body, Joseph O'Reilly has resigned. Before his brief auDA role, O'Reilly was the executive director of the Victorian Council for Civil Liberties and president of the Victorian AIDS Council.

auDa was set up last July with the goal of becoming Australia's peak Internet domain name space (DNS) body. In November, it won the rights to delegate domain names in the .com.au space after Melbourne IT's exclusive rights expire in October 2001.

Following the loss of O'Reilly, auDA has appointed director Mark Hughes as interim CEO.

Hughes said he stepped into the role because "someone was needed" to take care of urgent business. Contrary to newspaper reports, which cited lack of funding and staff shortages as the reason for O'Reilly's departure, Hughes said O'Reilly had actually taken up a position elsewhere. "There were frustrations with the [auDA] job, but don't believe everything you read," he said. "O'Reilly was lured away by another job."

auDA member Kim Heitman, who described O'Reilly's departure as "a shame", told *APC* the board's top priority is the formation of two panels. One will address the competition model for domain name allocation in Australia and the other will examine the existing domain name policy.

Both committees will welcome public input. "The Australian domain name policy document is very complicated, far more complicated than any other anywhere in the world," Hughes said. "This is the first time there has been an open process to allow the public to comment on it."

However, one Australian company has already reached beyond the jurisdiction of auDA to resolve its domain name problems.

Telstra has become one of the first companies in the world to successfully use the World Intellectual Property Organisation (WIPO) to challenge a cybersquatter, wresting control of the telstra.org domain name from an unregistered NSW business known as Nuclear Marshmallows.

The WIPO ruled in February that Telstra could reclaim the domain name, which had been registered by a Gosford business in November 1998. Repeated attempts by the WIPO to contact the listed owner of the site, Michael Jenkins, were unsuccessful; emails were not returned and the contact address given was a post office box. Investigations showed that some contact details supplied were false.

Under WIPO rules, Telstra had to demonstrate that the registration of the domain name had been an act of bad faith and was designed to confuse or mislead Web users. Telstra successfully argued that its branding was so well known in Australia that no-one could have been unaware of it when registering the telstra.org domain. (Unlike the .com.au domain, there are no effective restrictions on who can register any .org domain.)

One thing is in no doubt: domain names are big business. Strong growth in name registrations helped Melbourne IT, which controls .com.au registrations, make a profit of $1 million in 1999. Announcing its financial results for the previous calendar year in February, Melbourne IT said its revenue of $14.8 million exceeded its prospectus forecasts by almost 20%.

Angus Kidman, Cosima Marriner and Roulla Yiacoumi

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NEW FUND CREATED

Churn controlled as carriers boom

Telstra has managed to avert a court decision over its ability to transfer customers to its rivals after reaching agreement with the Australian Competition and Consumer Commission (ACCC) to create a $4.5 million fund to assist rival telcos which use Telstra's commercial churn process (the method of transferring a customer between telcos).

Under the new arrangements, Telstra will reduce the cost of churn, and the ACCC will use the $4.5 million fund to help rival telcos develop more efficient billing systems that can interact with competitors. Court actions relating to the dispute have been dropped, and the ACCC has withdrawn a competition notice over Telstra's handling of churn.

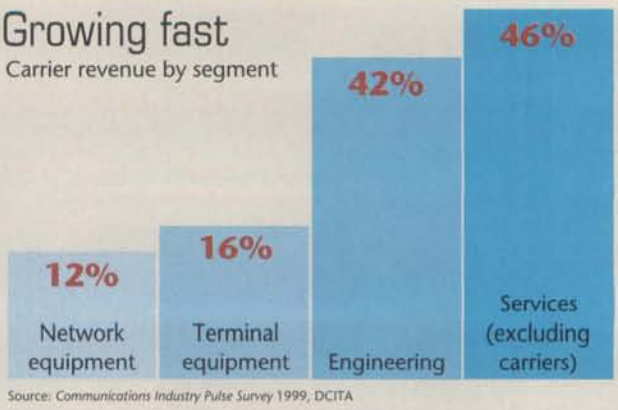
The ACCC announcement of the fund ends a bitter dispute stretching back to 1998, when it issued a competition notice against Telstra over its commercial churn process. Telstra had introduced the system after complaints from its rivals that it was not efficiently transferring customers who chose to drop Telstra for another carrier.

Announcing the deal, the ACCC said it was pleased that the benefits of competition in the local call market were becoming increasingly visible. "The ability to transfer local call customers between competing telecommunications carriers is fundamental to effective competition," ACCC acting chairperson Allan Asher said.

However, not all rivals were pleased. AAPT's legal and regulatory director Brian Perkins said much more needs to be done to improve the process of customer changeover.

Despite such problems, the telco scene in Australia continues to grow. The annual *Communications Industry Pulse Survey* estimates that turnover from licensed telecommunication carriers reached $24 billion in 1999. Capital expenditure also climbed from $5 billion in 1998, to $6 billion last year.

Angus Kidman and William Maher



Source: *Communications Industry Pulse Survey* 1999, DCITA

DELIVERY DELAYS

Virtual Communities' regional delivery hiccup

Virtual Communities, the name behind the cheap PC and Internet deal for union members, has delayed shipments to regional customers. *APC* has received a number of complaints from readers claiming the company has been unable to provide any explanation for the delay.

Managing director Ed Smith said up to 20% of customers had been "mucked around" but he denied the company is not coping with demand. "When we launched, we said we wouldn't begin shipping until late January or early February," he told *APC*. "This is the third week we've been shipping."

The problem lies with Internet service provider Primus, according to Smith. Until Primus can provide local dialup access to regional customers, the only choice for subscribers is to dial the ISP long distance. Smith said it could be eight months until the local POP rollout is complete but that there is "plenty of supply" of the IBM PCs.

The affected customers, all in regional areas of Australia, have been sent letters. "We're staggering the mail-out over three days so we can cope with the telephone inquiries that follow," Smith said. The customers will be offered a refund. Alternatively, customers can opt to receive their PCs now and either dial long distance or wait until local access is available.

Last November, Virtual Communities announced the deal, available through organisations such as the Australian Council of Trade Unions (ACTU) and Australian Retirement Fund, in a bid to make computing affordable to families (see *APC* January, page 17). Members could choose from three different plans.

Although Smith refused to say how many people have signed up for the package, he denied it is anywhere near the touted 70,000 figure. "It's a significant figure, but it's definitely not [that high]."

Roulla Yiacoumi

News Roundup

- Optus has cemented its relationship with Excite@Home by assuming control of Excite Australia, the local portal arm of Excite that was originally launched by LibertyOne. LibertyOne announced in early March that it was restructuring its arrangement with Excite@Home, which originally licensed LibertyOne to develop regional versions of the Excite portal in September 1998. Under the new deal, Excite@Home has bought out LibertyOne's stake in the Excite Asia Pacific joint venture for $19.5 million. Excite@Home has transferred the management of the venture to its joint venture with Optus. The local cable venture will be renamed Excite@Home Australia.
- Despite the hype, the country's most famous Internet export failed to do great things when it debuted on the Australian Stock Exchange (ASX) in late February. As Internet search directory company LookSmart is already listed on the Nasdaq in the US, no extra funds were raised for the company's compliance listing on the ASX. LookSmart set the final price for its Australian shares at $3 after closing its bookbuild more than three times oversubscribed. LookSmart stock was worth $3.30 when it commenced trading on the ASX thereafter. Shares in the company reached an early high of $3.39 before settling back.

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ISPs MERGE

eisa scoops Telstra to buy OzEmail

Telstra's dream of buying OzEmail has been shattered, following a successful competing offer by fellow ISP eisa. eisa will pay OzEmail owner UUNet between $300 million and $350 million for its consumer Internet business.

Telstra lost its bid to acquire OzEmail after the Australian Competition and Consumer Commission (ACCC) ruled the Telstra Big Pond and OzEmail merger would significantly lessen competition in the Australian Internet space (see *APC* March, page 30).

The ACCC has already said it does not intend to intervene in eisa's purchase, even though it will give eisa more than 400,000 customers and 20% market share.

At the time of going to press, eisa had still to announce how it planned to pay for the acquisition. With less than $35 million in cash reserves, eisa cannot make the purchase without a significant financial injection from a third party.

Company officials said they are close to finalising the funding for the acquisition. eisa's financial advisor Robert Crossman, head of investment banking at Hartley



Poynton, said that eisa is considering a number of options to raise the millions of dollars required.

eisa CEO Damien Brady (pictured) said the OzEmail brand will be retained, but the companies' staff and assets will be merged. eisa is expected to finalise the OzEmail purchase this quarter.

Brady said that while Telstra's acquisition of OzEmail would have had a big impact on the Internet industry in Australia, eisa would now be in a position to take on a significant competitor.

"It's number four [eisa] joining with number two [OzEmail] to take on number one [Telstra Big Pond Home]," he said.

Roulla Yiacoumi

Cashbook: Loss Leaders

In February and March, most listed technology companies announced their results. The outcome? Companies with massive losses saw big gains in share price, while companies with small losses tended to be punished. That's dot com logic.

For instance, Sausage Software made more money in the first six months of the 2000 financial year than it did for the whole of 1999, announcing a net income of almost $2 million. The company announced an operating profit of $1.94 million for the six months ending December 31, 1999. Total sales were up 775% to $17.25 million. Sausage chairperson Gil Hoskins said the results were in line with company expectations, but Sausage Software closed 4 cents down in trading on the day its results were announced.



Exceeding its forecasts, online travel agency travel.com.au had a revenue of $48.6 million for the half year, and the company said its sales for the six months to December 31, 1999, represented a 190% increase on the same period in 1998. The day the results were announced, its shares fell 8 cents to $1.50.

Compare that to the treatment meted out to ecorp, which stuck with the dot com trend of growing audiences and growing losses, posting a $10.7 million loss in its half-year results. Revenue for the online developer was up to $30.8 million. No single venture within ecorp was profitable. And the market's reaction? ecorp rocketed up in value, jumping 20% within a week.

Or take Web media company LibertyOne, which said it had incurred a loss in its moves to establish its Internet business across the Asia-Pacific region. The company's losses blew out 2,676% from $341,000 in 1998 to $35.6 million. LibertyOne's $36 million loss far outweighed any gains made during 1999. Its revenue grew 346% to $24 million for the period, compared to $5.7 million in 1998. But the buyers didn't care, and the company's price remained unchanged.

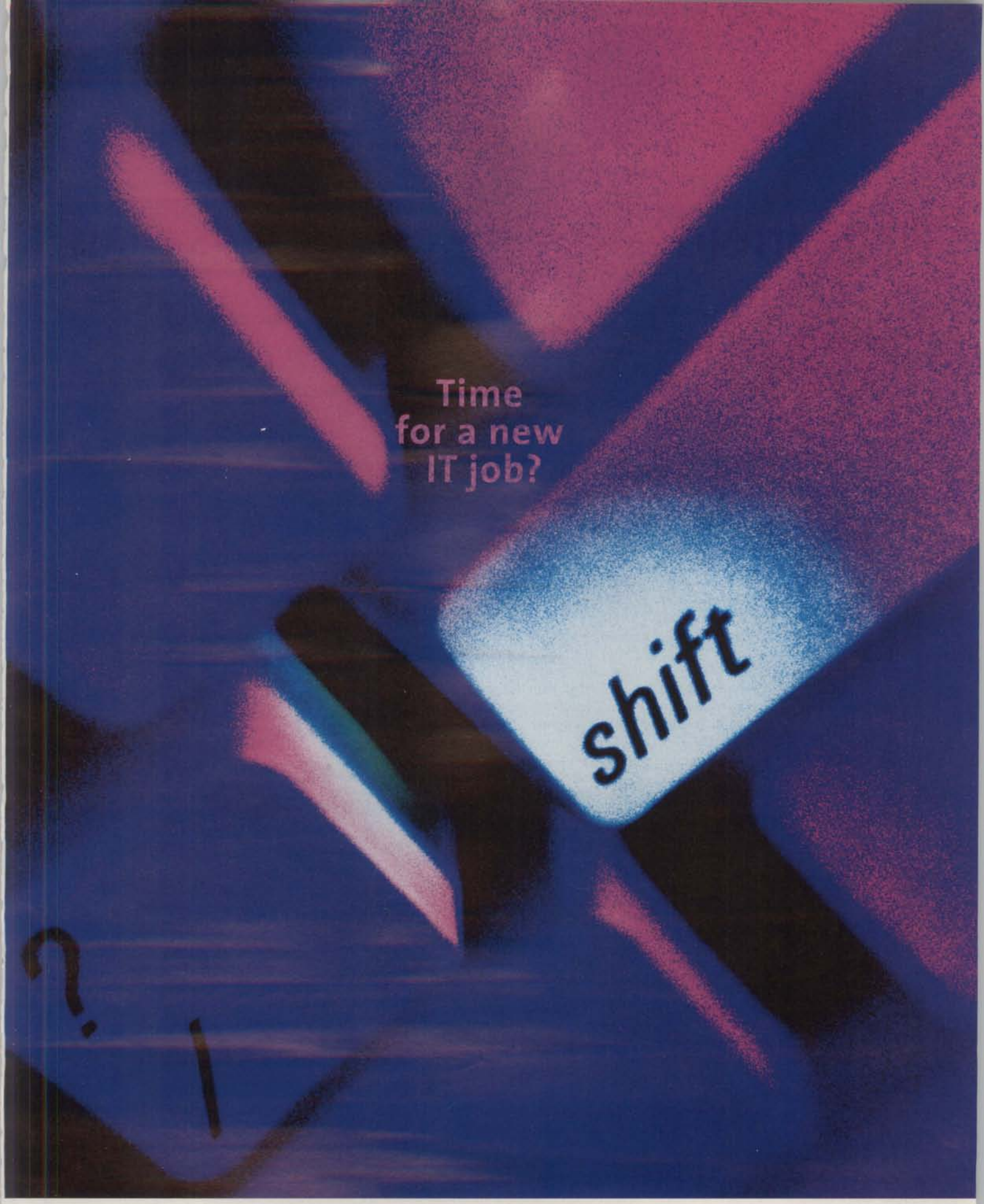
For up-to-the-minute financial news from the IT sector, check out Newswire's continuously updated Cashbook service at http://newswire.com.au/cashbook/.

News Roundup

Graphics-tool-company-turned-Linux stalwart Corel and development tool shop Inprise (still better known under the Borland moniker) have announced plans to merge in a $US2.4 billion stock swap. Although there may not immediately seem to be a lot of common ground between the two companies, officials believe that the growing enthusiasm for Linux in both their user bases will provide a common bond. Inprise will continue to operate as a separate division, and Inprise CEO Dale Fuller will chair Corel's board of directors. The company headquarters will remain in Canada. The deal is expected to be concluded in the first half of this year.

Concern is growing over the number of office workers who spend hours surfing the Internet during their work day. A survey of 150 office workers conducted in January by IDC found that a third of respondents were using the Web for personal reasons. Of those workers who use the Web for personal reasons, 37% said they visited sites relating to sexuality or sex education and 21% said they accessed 'crime' Web sites.

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Despite the endless hype about handheld devices, writing software for portable systems poses its own unique challenges.

Handheld software not child's play

Software developers have a tough enough time keeping up with PC technology; extra RAM, bigger screens, larger hard drives, more powerful processors — it's enough to make your head spin. But what about software that runs on a device the size of your hand?

There is an emerging breed of software developers who focus solely on creating bite-size applications for sub-PC devices. Their aim is to capitalise on the growing interest in mobile devices such as PalmPilot, Windows CE devices, smartphones and even wearable computers.

Jerry Granucci is one of those developers. His San Francisco-based company, Concept Kitchen, makes software for the leading consumer handheld platform, the Palm OS. Concept Kitchen was founded in 1995 and has a team of 20 programmers.

Like many handheld developers, Granucci admits there are major difficulties in creating software for palm-size devices. The devices have small screens, little memory and tiny (or no) keyboards.

These problems can turn programming into an intricate task. For example, Granucci's latest project — a city guide called CitiSync — took eight months to build, yet weighs in at less than 1M.

According to Granucci, most of the work was spent customising the software for the Palm OS. CitiSync uses information from travel publisher Lonely Planet, which has been converted to fit on a small screen. "There was a lot of architectural work done in the beginning," he said.

Another problem was converting the Lonely Planet city maps for the Palm screen. Each map had to be converted into bitmap form and then resized.

Granucci would like to offer CitiSync on other platforms, but he admits the conversion won't be easy. He would only say that Concept Kitchen is looking at a CE version of CitiSync. "There's not a lot of development leverage when you go to other platforms," he said.

Australian software developer Doug Bertinshaw shares Granucci's concerns. Bertinshaw's company, Retriever, makes business data tools for Windows CE. The company is also working on products for the Palm and EPOC operating systems.

Bertinshaw argues there are still major problems converting software from one platform to another. Retriever's first products were built for the Apple Newton, but were later ported to Windows CE.

"It took us six months to do the conversion of underlying code on the Newton to support CE," he said.

The big problem is the lack of documentation explaining each operating system. Bertinshaw describes CE programming as "trial and error", although he said that the situation is quickly improving.

Another concern is the devices themselves. Bertinshaw said handheld PCs are unreliable, and have major battery problems. "That's OK for the casual user, but for a business user it's unacceptable," he said.

To deal with the problem, Retriever's programmers encode battery warnings into each piece of software.

Retriever is also working on a solution to the screen size problem. The programming team is developing a design toolkit for screen forms on Windows CE.

If successful, the toolkits will make it much easier to translate screens designed for one Windows CE device to another. Currently these screens can range in size from an A5 sheet to a tiny handheld display.

"It is an issue," he said. "[The problem] isn't so much in the underlying coding, but in the skills to represent data on different form factors."

Despite these problems, Bertinshaw remains confident his job will be easier in the future. He predicts portable PCs will eventually become more compatible, possibly even to the point of a single standard. "There's no clear winner in the handheld space. They all have value," he said. "We can't pick a winner. So we develop for them all."

William Maher

Colour of your Palm

While Windows CE has featured colour displays for some time, developers of the Palm OS — by far the dominant operating environment for handhelds — have so far not had the added complications of supporting colour in their applications. That is set to change, however, with the long-awaited release of the colour screen version of Palm's handheld, the Palm IIIc.



The device's release has been rumoured since late last year, when Palm added colour support to the Palm OS. It debuted in Australian shops in mid-March and its features include 8M of memory, a 256-colour display, weighs 212g and sells for $899.

Prospective customers will be eager to see whether Palm's IIIc suffers from the same problems as similar Windows CE devices. Many of these products have been criticised for poor battery life and performance. Palm claims it has largely avoided those problems. Officials are claiming that the new Palm IIIc has a battery life of two weeks under "normal" use.

Other developers of Palm OS devices, such as IBM and Handspring, are expected to follow suit with their own colour devices. If the concept takes off, developers will have to retrofit their apps to support the new feature.



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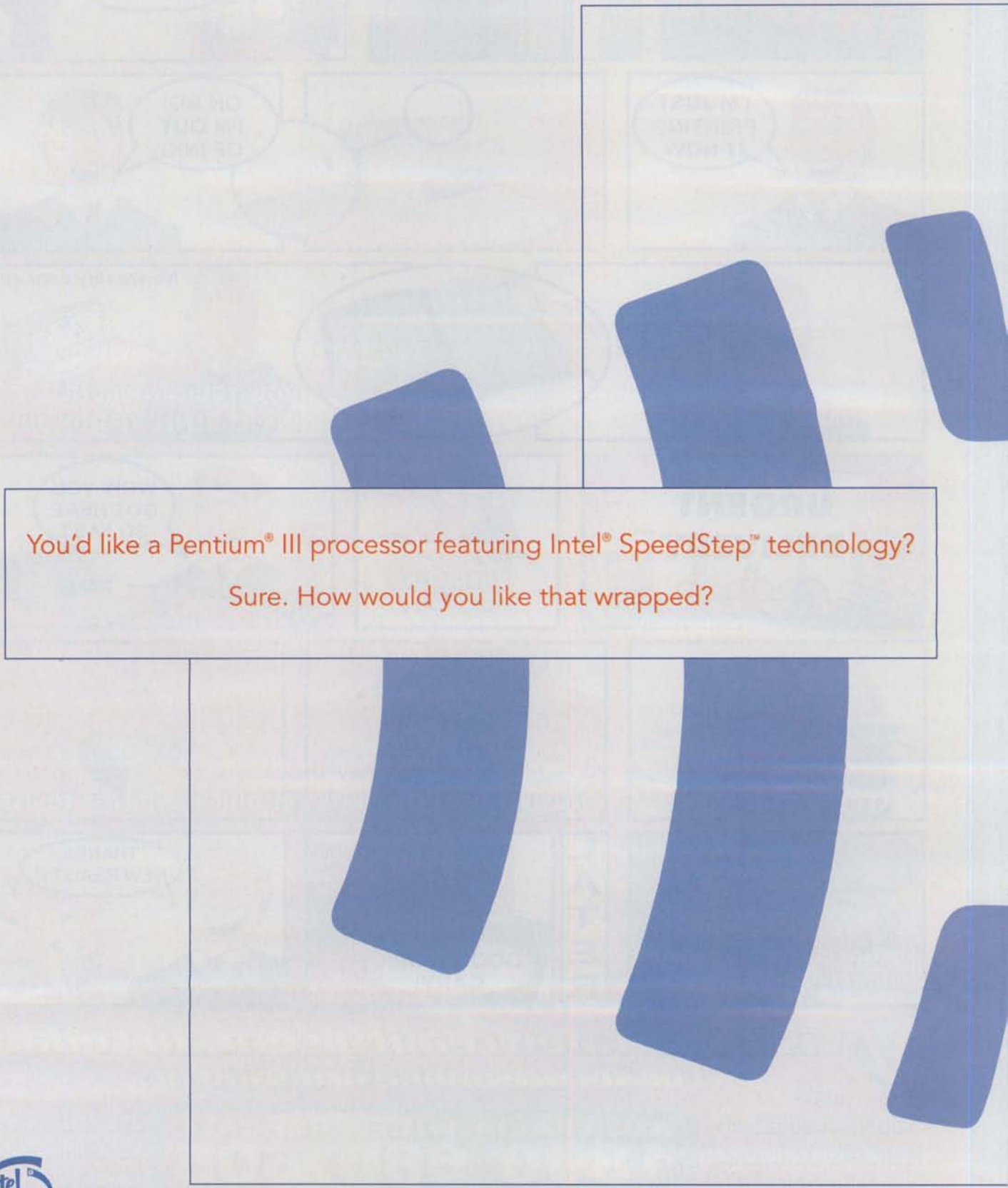
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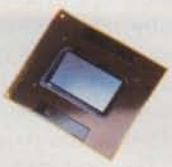


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SPECIAL REPORT

Cable Internet: Is it

After years of delays, both Optus and Telstra are now offering unlimited access broadband Net access via their cable networks. In an exclusive head to head, *APC* tests the services and asks whether or not they live up to the hype.

Australians have been waiting eagerly since 1996 for the opportunity to use the national hybrid fibre coaxial (HFC) pay TV networks rolled out by Optus and Telstra. Telstra's Big Pond Advance (originally Big Pond Cable), launched in May 1997 and struggled to gain subscribers. This was partly due to its pricing structure, which is based on download volume. Telstra further alienated subscribers last year when it began charging for internal traffic within the Big Pond Advance system.

After years of promising that a cable service was "imminent", Optus finally launched the Optus@Home service in November 1999, in conjunction with US broadband giant Excite@Home. Optus' service had one immediate advantage over Telstra's: it charged a flat monthly rate with no download limits. Telstra was forced to respond with its own all-you-can-eat service, but there have been several delays in getting the service started.

APC has tested Big Pond Advance before (see *APC* July 1997, page 33), but the arrival of a competitor makes it worth revisiting. Can both services deliver on the promise of a high-speed, permanent Net connection? Yes, they can — but there are some potential hiccups which should make you think twice before investing in either service.



Installation

Installation of both services is simple, especially if you already have the relevant cable TV service (Foxtel or Optus Vision) installed, as *APC* did at both of our installation sites. The end result of installation is a TV-antenna-style connection in a wall.

The next step is installing a network card, configuring it and plugging the cable modem in. In theory, any Ethernet card should work with cable Net, but both companies require you to use a card that they supply (and you pay for) to minimise conflicts. (Telstra doesn't supply a Macintosh Ethernet card, eliminating Mac owners who don't have network-capable machines.)

Telstra uses a proprietary Motorola CyberSURFR modem, but its current expansion plans call for the introduction of a standard DOCSIS-compliant modem later this year. Optus@Home uses a DOCSIS-compliant Nortel modem.

Software and hardware installation is carried out by onsite technicians. *APC* had the opportunity to test the install procedure for Telstra, because Windows had to be reinstalled on the test machine. The instructions provided were clear and well laid out — apart from a little driver confusion with the network card, it was up and running quickly.

Logon to Telstra uses simple custom software. Windows 95/98, NT and Mac clients are available, and a Windows 2000 client should also be available by the time you read this. Optus incorporates its log-on system into a customised version of your preferred browser (both Internet Explorer and Netscape Navigator are available). Linux isn't officially supported by either, although you can find details of how to log on to Telstra under Linux at http://www.iosm.com.au/bpa.shtml.

Performance

The main reason for using a cable modem is speed. Telstra has copped some flak recently for its decision to limit individual connections to 400Kbps. At the time of testing, Telstra was unable to provide a 400Kbps account, so *APC* looked at its full (per-megabyte charging) service, which is significantly faster than the service it plans to offer after March 1. If you're a current Advance subscriber, you'll have to wait until April 1, which suggests Telstra hasn't learnt much from last year's internal traffic debacle.

Broadband and dialup: Average ping response times (ms)

Site	Telstra	Optus	MCI	ABC	Sprint	AT&T
Big Pond Advance	11.8	33.0	345.4	12.8	301.2	296.8
Big Pond Home (dial-up)	201.0	269.0	434.0	115.0	465.0	405.0
Optus@Home	32.2	31.6	354.8	32.3	338.7	294.9
Optus Internet (dial-up)	270.0	272.0	539.0	145.0	579.0	563.0

Bearing that in mind, the speed in both cases was remarkable. Email was almost instantaneous between the provided mail services and the main *APC* mail server running Lotus Notes. Web site loading times were quite fast. Although some overseas sites loaded slowly, this was still faster than a 56K modem connection to the same site.

APC ran the same set of tests for Big Pond Advance and Optus@Home as it did for the tests in the ISP reviews (see 'How we tested', page 107). Both services performed well on the ping, Web and FTP tests, but Telstra had a slight edge in the ping tests (detailed above) and a notable advantage on FTP files. For Telstra, the sample FTP download was incredible — the 200K files downloaded from an Australian site in four seconds, and the results for the international site were almost identical. Optus recorded speeds of 15 and 20 seconds for the same tests — still much faster than dialup, but not quite as impressive.

The table above shows how Optus' and Telstra's broadband and dialup services compare. The differences in local ping times between broadband and dialup were very impressive, although the international

worth it?

pings could have been faster. Interestingly, no ping packets were dropped in the testing of either company, which suggests a reliable service, especially for gamers.

Unfortunately for Telstra, the other remarkable factor was the rate at which we hit our download limit; on one day of testing we managed over 500M of downloads. Telstra will still be operating its per-megabyte service alongside its 400Kbps service for speed freaks, but unless you want quick access to small data, you have to be very careful, especially as the usage meter isn't updated until the next day. This means it's easy to clock up the downloads without even realising it.

Optus@Home also exposed one major flaw: its inability to maintain a permanent connection. On several occasions the service stopped operating when the computer was idle for a brief period. At one point, it actually stopped working during a download. Reconnecting requires a reboot, or in extreme cases, disconnecting the modem from the power supply. Although this doesn't incur any extra charges (unlike a bad dialup connection), it's a major annoyance. Optus admits that its Melbourne network (which is where APC tested the service) has suffered from some teething problems, but the service's manual notes that such disconnects may occur, suggesting a more fundamental problem.



Content

Speed aside, the other hook for broadband services is content, particularly multimedia. Fast access is no longer enough to attract customers. Despite recent boasts about Doug Mulray, Advance was somewhat lacking in specialised material. Apart from existing Telstra content being faster, the main attraction is access to its Wireplay online game servers, which shine under cable modem conditions. (Access to Wireplay costs an extra $10 a month.)

Optus' content is also patchy; it has a selection of RealVideo format movie trailers and some CNN news feeds which download at high speeds, but little else that you couldn't find elsewhere on the Web.

The bottom line

The restrictive rollout policies of both companies (see 'Regional restrictions') means relatively few people are likely to have the luxury of choosing between the two providers. If you do have a choice, there are a few key factors to consider — excluding price (see 'The cable price is right').

Telstra has made an interesting decision to limit its 'unlimited' access plan to 400Kbps. This is still significantly faster than a modem connection (about eight times faster than the average 56K connection) but well below the capacity of the cable — and well below that of Optus. Cable can theoretically deliver the full 10Mbps supported by the Ethernet card, but you will rarely ever approach this limit. Telstra does have an advantage in that it will install in multi-dwelling units, but it's still shooting itself in the foot — at least in terms of perception — by having what will invariably be derided as a slower service. APC will take a separate look at the 400Kbps service later this year, once Telstra can supply such an account.

Optus@Home may perform better, but the current limits on the rollout mean that you're likely to wait up to six months before you even have the option of installing it (and even longer if you live in a unit or townhouse). The lack of a consistent connection is also a major disappointment, especially as Optus has heavily promoted this feature. In pure speed terms, both services leave dialup for dead, but Telstra and Optus are going to have to work on other details before APC can fully recommend either service.

Alex Kidman and Angus Kidman

Provider	Telstra Big Pond Advance
Phone	1800 060 391
Online	http://www.bigpond.com/advance/
Provider	Optus@Home
Phone	1800 504 504
Online	http://www.optushome.com.au/

Regional restrictions

Although cable Internet promises high-speed access, the service is essentially restricted to Sydney, Melbourne and Brisbane, because the main HFC cable doesn't exist outside these cities.

This problem has been seriously compounded in the case of Optus@Home, which has only rolled out the service to a limited number of Sydney and Melbourne suburbs, and won't install in multi-dwelling units (such as flats and townhouses). The 'no units' clause is extremely restrictive: no-one on APC's staff (about 30 people spread all over the Sydney region) was able to have the service installed for our tests, which were eventually conducted in Melbourne. This suggests that Optus is not entirely ready to launch a mass-market service.

The cable price is right

Optus@Home customers who pay on a month-by-month basis will pay $59.95 a month, as well as $398 for installation charges — this is a total annual cost of $1,117.40. Customers who sign up for 12 months will pay $69.95 a month, but will only pay a $199 installation fee, creating a total annual charge of $1,038.40.

Telstra has adopted a similar two-tier pricing scheme for Big Pond Advance. Unlimited access is available for $59.95 a month on a three-month contract, along with a $369.95 installation cost (an annual total of $1,089.35). Alternatively, customers can pay $65.95 a month plus $99 to install with an 18-month contract ($890.40 for a year, or $1,286.10 over the life of the contract).

Telstra has also elected to keep the unpopular download-limited plans, where you are given a certain megabyte allowance, and then pay 24 cents a megabyte thereafter. These don't have the 400Kbps speed limit, but may well end up costing you a small fortune.

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Asus AGP-V6800

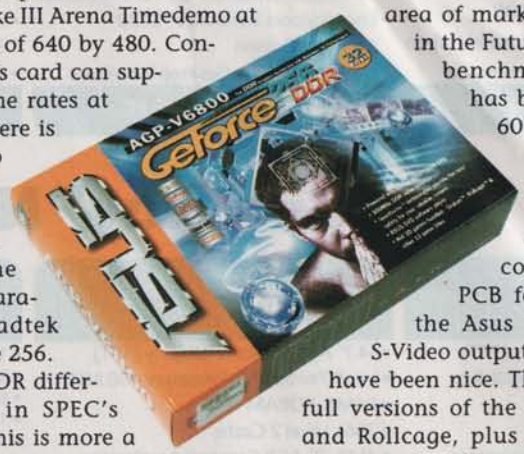
When it was re-released late last year, nVidia's GeForce graphics chip had us drooling and was a finalist for *APC*'s Consumer Product of the Year award. Finally, 3D graphics were how they should be: smooth, textured and rich, not to mention fast.

The GeForce is the first commercially available consumer graphics chip to provide hardware transform and lighting (T&L), the process in which the 3D wireframe of the image is composed with lighting levels and effects calculated. Most graphics cards leave the system processor to calculate T&L, which bogs the system down. A T&L-capable card frees these system resources for other tasks, and makes for speedier graphics. (For more detail on T&L, see Technobabble, *APC* December 1999, page 150.)

In the past, *APC* has looked at other GeForce-based video cards, notably the Leadtek WinFast GeForce 256 (*APC* December 1999, page 40) and the Asus AGP-6600 video capture card (*APC* March 2000, page 117). Mention should also be made of the Diamond Viper II (*APC* February 2000, page 30), a T&L-capable card based on the Savage2000 graphics chip.

Cassa has supplied *APC* with the first GeForce video card to feature DDR (double data rate) memory. Previous GeForce cards had SDR memory. A card with SDR and a clock speed of 150MHz could previously only perform one action, on the rising edge of each clock cycle. DDR memory transfers on both the rising *and* falling edge of the cycle, effectively doubling the peak bandwidth. The Asus card claims to run at 300MHz, which is not exactly true. It still runs at 150MHz but outputs twice as much, aping the output from 300MHz memory.

The benefits of T&L and DDR with the Asus AGP-6800 are not immediately apparent. In our tests (see table below) the card showed a huge improvement with frame rates in the Quake III Arena Timedemo at a low resolution of 640 by 480. Considering that this card can support decent frame rates at 32-bit colour, there is no need to drop the resolution so low. At the other test resolutions, the frame rates are comparable to the Leadtek WinFast GeForce 256.



Where the DDR difference shows is in SPEC's Viewperf test. This is more a test of a card's geometric capabilities (rather than the rendering capabilities brought out by gaming tests), and with a geometry processor onboard, the AGP-6800 has done very well. In comparison to the Leadtek WinFast GeForce 256 the improvement is huge. Usually graphics cards fall within two distinct Viewperf groups — those that do well and those that do badly. Cards usually cluster within a narrow score range, but the AGP-6800 has exploded the high score range in a few of the tests, proving that DDR really works. The other area of marked improvement is in the Futuremark 3DMark 99 benchmark, where there has been an increase of 60 points.

The card has only one output: VGA. It does have a video expansion connection on the PCB for upgrading with the Asus 3D glasses but an S-Video output on the back would have been nice. The card comes with full versions of the 3D games Drakan and Rollcage, plus a CD of 12 game demos and trials.

Darren Ellis

Contact	Cassa
Phone	(07) 5445 2992
Online	http://www.asus.com/
Price	$499
In short	Excellent performance. For state-of-the-art graphics, you could do a lot worse.

Benchmark	Asus AGP-V6800	Diamond Viper II	Leadtek WinFast GeForce 256
Futuremark 3DMark 2000	3,318	Not tested	Not tested
Futuremark 3DMark 99 Max	3,742	3,534	3,685
Viewperf: Advanced Visualiser (fps)	59.3	6.03	59.1
Viewperf: DesignReview (fps)	19.11	4.43	16.5
Viewperf: Data Explorer (fps)	24.61	4.75	15.9
Viewperf: Lightscape (fps)	2.7	0.75	2.1
Viewperf: ProCDRS (fps)	Not tested	Not tested	7.8
Quake III at 640 by 480, 16-bit colour (fps)	86.6	63.8	62
Quake III at 1,024 by 768, 16-bit colour (fps)	57.6	50	55.7
Quake III at 1,600 by 1,200, 32-bit colour (fps)	34.7	21.9	35.3
TreeMark: simple (fps)	48.95	6.47	42.8
TreeMark: complex (fps)	12.65	1.41	12.2

Test system specifications

Dell Dimension XPS-450, a 450MHz Pentium II with 128M SDRAM, 10.1G IBM-DDTA-371010 drive, FAT32 file system, Toshiba DVD-ROM SD-M1202, Turtle Beach Montego A3D running Windows 98. Tested using a Diamond Viper II or a Leadtek WinFast GeForce 256.

3DMark 2000 and TreeMark were run at 1,024 by 768 in 16-bit colour.

Viewperf was run at 1,280 by 1,024 in 16-bit colour.

3DMark 99 was run at 800 by 600 in 16-bit colour.

All products used in these tests are shipping versions available to the public at the time of publication, unless otherwise stated.

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IBM ThinkPad 600X

The big trade-off in portable computer design is battery life versus weight. The longer that designers want a portable to run, the bigger and heavier the battery has to be. Consumers demand the most power-hungry components in notebooks — larger screens, faster hard disk drives, DVD-ROM drives and of course the latest, fastest processors — and then complain that they're too heavy and the batteries don't last long enough.

Although the processor isn't the most power-hungry component in a notebook, reducing its power consumption can have a marked effect on battery life. One of the big advantages of producing processors under a 0.18-micron design process rather than 0.25-micron, as Intel started doing late last year, is that the processors consume less power.



In addition, Intel has added SpeedStep technology to its new 600 and 650MHz Mobile Pentium III processors, which allows the processor to switch down to 500MHz while the notebook is running on batteries (you can also manually choose to run at either speed). For a slight reduction in processing power, you get extended battery life. Intel is guessing that most notebook owners would use their most processor-taxing software while sitting at a desk, and would use less demanding applications while mobile.

The big question remains: does the trade-off work? Does the reduction in power give a corresponding increase in battery life?

To find out, *APC* tested an IBM ThinkPad 600X, which features the 650MHZ Mobile Pentium III processor. The system tested was a pre-production model, but the 600X should be available by the time you read this, at a price of about $8,600. It comes with 64M of RAM and a 12G hard disk drive.

APC ran the same series of benchmarks in 'maximum performance mode' with the processor running at 650MHz, and in 'battery optimised mode' with the processor at 500MHz. Not surprisingly, the most significant difference was in the processor benchmarks, which reflected the 30% drop in processor speed. However, the other benchmarks showed about a 10% to 15% reduction in overall performance. This makes sense when you remember that a computer's overall performance is a result of the processor, hard disk drive, memory and display all working together, and SpeedStep only reduces the speed of the processor.

This reduction in performance is acceptable, and would not be noticed in the vast majority of applications. However, the improvement in battery life was not breathtaking. In maximum performance mode, the battery lasted two hours and 27 minutes under the rigorous demands of the Ziff-Davis BatteryMark 3.0 test. In battery-optimised mode it lasted two hours and 43 minutes, an improvement of just over 10%. Given the choice, *APC* suspects many users would opt for a 20% power reduction in exchange for 20% more battery life (or even 30% for 30%). However, it's likely that reducing the processor speed to lower than 500MHz would not make the battery last longer. After all, the screen and hard disk drive consume a great deal more power than the processor.

If battery life is your greatest concern, buy a notebook with a big battery, or even two batteries. Also, don't forget that Intel's 500MHz Pentium III is manufactured using the same 0.18-micron process, which will save battery life and will cost significantly less than a 650MHz notebook. But if you want the top performer, Intel's latest Mobile Pentium III is a powerful beast.

Josh Mehlman

Product	IBM ThinkPad 600
Contact	IBM
Phone	1800 815 154
Online	http://www.pc.ibm.com/au/
Price	$8,600 (estimated)
Warranty	3 years RTB
Specifications	
Processor	Intel Mobile Pentium III 650MHz
Secondary cache (K)	256
RAM and type (maximum RAM)	64M PC100 SDRAM (576M)
Hard disk drive	12G
Video bus type	AGP
Video RAM	4M SGRAM
Video controller chip	NeoMagic MagicGraph 256ZX
Pointer device	Trackpoint
Dimensions (cm, h by w by d)	3.7 by 30 by 24
Bare minimum weight	2.3kg
PC card slot type	Two type II or one type III
Port replicator	Available
Docking station	Available
CD-ROM drive/DVD	6x DVD
Soundcard	Crystal Semiconductor CS4239
Internal modem	V.90
Display	13.1in TFT
Maximum internal resolution	1,024 by 768
Battery type and rated battery life	Lithium ion/3 hours

Benchmark Results	Maximum performance (650MHz)	Battery optimised (500MHz)
CPUmark99	58.3	46.6
FPU WinMark	3,470	2,670
Business Disk WinMark 99	2,030	1,940
High-End Disk WinMark 99	7,160	7,380
Business Graphics WinMark 99	20.4	19.7
High-End Graphics WinMark 99	269	230
Business Winstone 99	11.9	10.5
SYSmark 2000	80	71
Internet Content Creation	96	84
Office Productivity	69	63
BatteryMark: Battery rundown time	2 hours 27 minutes	2 hours 43 minutes

The products used in these tests are shipping versions available to the public at the time of publication unless otherwise stated.

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I just stepped out into space.
No, really, I DID it! I musta been
100 feet up, man, it was KILLER ..."



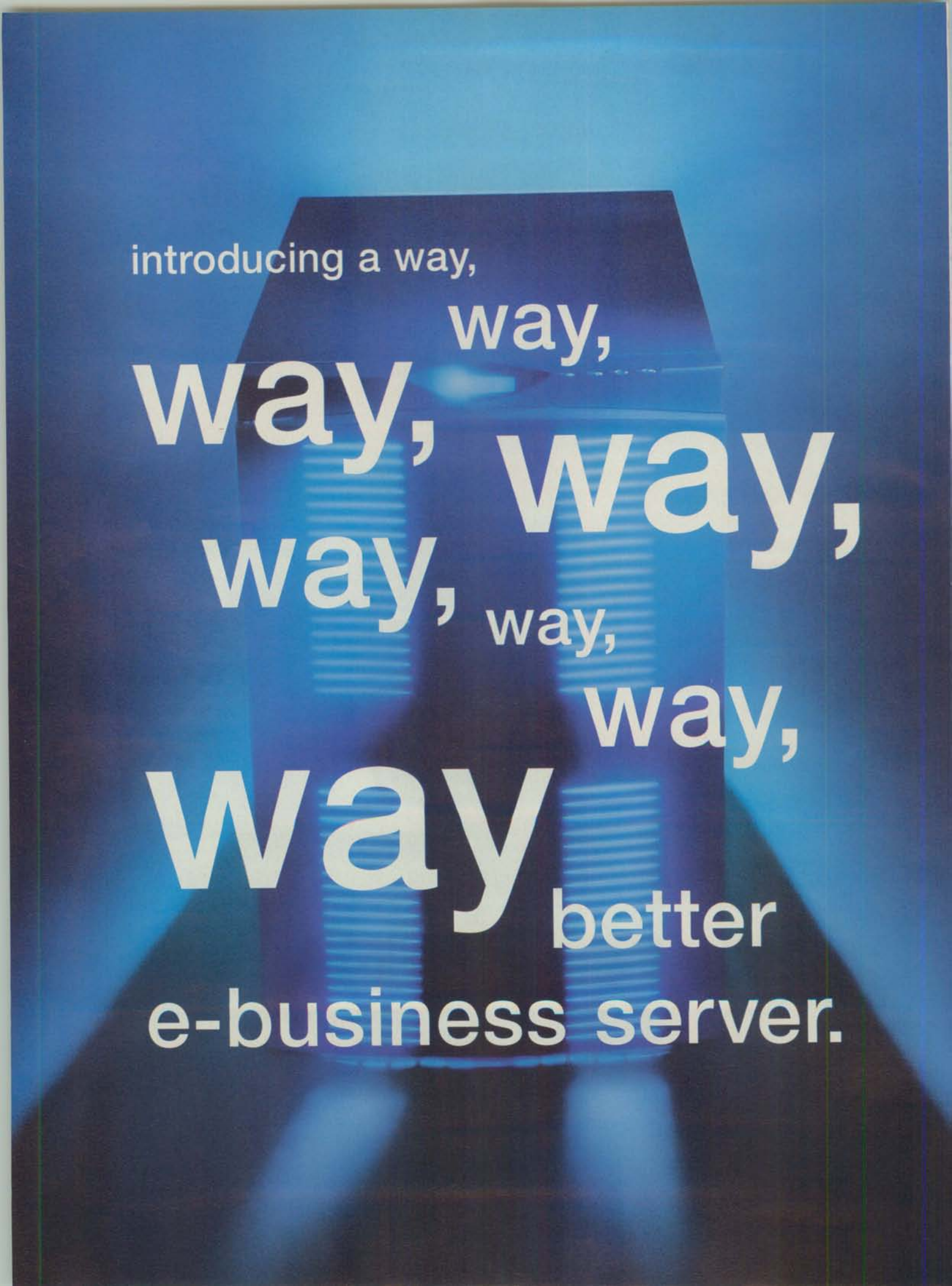
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8-way intel® pentium® III xeon™ processor-based servers. now high-performance e-business is both achievable and affordable. here are eight ways that 8-way intel-based servers will change e-business: ① you will have the high performance you need to run the most demanding e-business applications. ② one platform powers both nt and unix* solutions, making e-business more accessible and affordable than ever. ③ the ability to scale to 8-way on a single architecture simply gives you a broader choice of server solutions. ④ built-in performance headroom absorbs sudden spikes in demand. ⑤ a broad range of clustering solutions delivers maximum uptime and availability. ⑥ a wide choice of os, apps, database software and server sourcing gives you unprecedented flexibility and agility. ⑦ systems are widely available, thanks to overwhelming support from leading server brands worldwide. ⑧ all of which adds up to this: you are now ready, both financially and technologically, to take e-business to the highest level. make way for 8-way. → *intel.com/ebusiness*

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Canon PowerShot S10

Digital camera manufacturers boast ground-breaking innovations with almost every new model, but Canon's latest incarnation of its pocket-sized digital, the PowerShot S10, is more of an incremental step forward than a major development.

The case, which is brushed aluminium alloy rather than the usual plastic, gives the body a solid feel, and the controls are handy and well signposted. Canon has stuck with its film-style selector wheel for the major mode selections, and some slightly fiddly push buttons for flash, timer, and macro. The biggest change to the controls is the addition of a four-way 'omni-selector' cursor control. This makes the S10 truly user-friendly, unlike the previous A5, A50 and Zoom models which use a tedious and complex menu-driven system. Add to that a USB-capable connection (a serial connector is also supplied) a crisp auto-pop-out 35 to 70mm equivalent lens and a 2.11 megapixel CCD, and the whole package is very good for a pocket snapper. The camera uses a standard 8M Compact Flash card, and is supplied with a 6V NiMH rechargable battery and charger. It can also take a standard lithium photographic battery if there is no power supply at hand.



Instead of the usual plethora of connection ports, the S10 has a single outlet connector, which can cope with both the serial and USB cables supplied. There is also a direct video out for TV connection (plus the required cabling). For immediate image viewing, a 1.8in LCD viewfinder and viewing screen sits on the back panel, and most viewing and editing functions are controlled by the four-way selector control. An additional digital zoom extends the magnification by four times (up to an equivalent 280mm lens), and the images stay precise even at this setting.

A generous range of film speed, white balance, resolution, image size, exposure compensation, sharpness and contrast settings are all menu controllable without too much complexity. The results are excellent for a camera of its size, as there is very precise and accurate image reproduction right to the edges, and no chromatic, tonal or other lens-based distortions. Flat colour areas come out particularly well, and there were almost no artefacts at the highest resolution.

Combine all this with good-quality bundled software — Zoom Browser, PhotoStitch and Adobe PhotoDeluxe — and you have a real alternative to the family film camera, as long as you've got the cash.

Jeremy Torr

Contact	Canon Australia
Phone	(02) 9805 2000
Online	http://www.canon.com/
Price	$1,599
In short	Not cheap, but one of the best pocket digitals currently available.

Armadillo Virtual Gate

Security is something that many computer users, both novices and the computer illuminati, have had to take much more seriously over the past five years. If you're in the know, setting up your machine to be relatively secure isn't too hard, and you'll recognise where the potential flaws may lie. On the other hand, if you're relatively new to computer security, there's a lot to learn and a lot of mistakes can be made. Virtual Gate attempts to make security for your PC an easy affair. However, it fails.



The basic hardware of Virtual Gate is interesting; it's a technology that hasn't been available cheaply to home users before. It has a dedicated card reader that plugs into your serial port and controls access to your system through installed software. Installation is simple, once you work out that the power for the card reader plugs into the serial port plug, as opposed to the reader itself. It's not clear why.

Once the software is installed, security preferences can be set and card passwords initialised. The challenge then was to try to break Virtual Gate. Admittedly, we knew what we were doing, but it still shouldn't have been this easy.

Problem one. Card removal isn't detected for about 30 seconds. During this time apps could have been opened, data deleted, and so on. More worrying is how this leads to . . .

Problem two. If you remove the card, start messing about and are actively dragging something when the security features kick in, the Start menu is still accessible. True, you can't see what you're messing with, but it wouldn't take too much effort to open an MS-DOS prompt and type format C:/, for example.

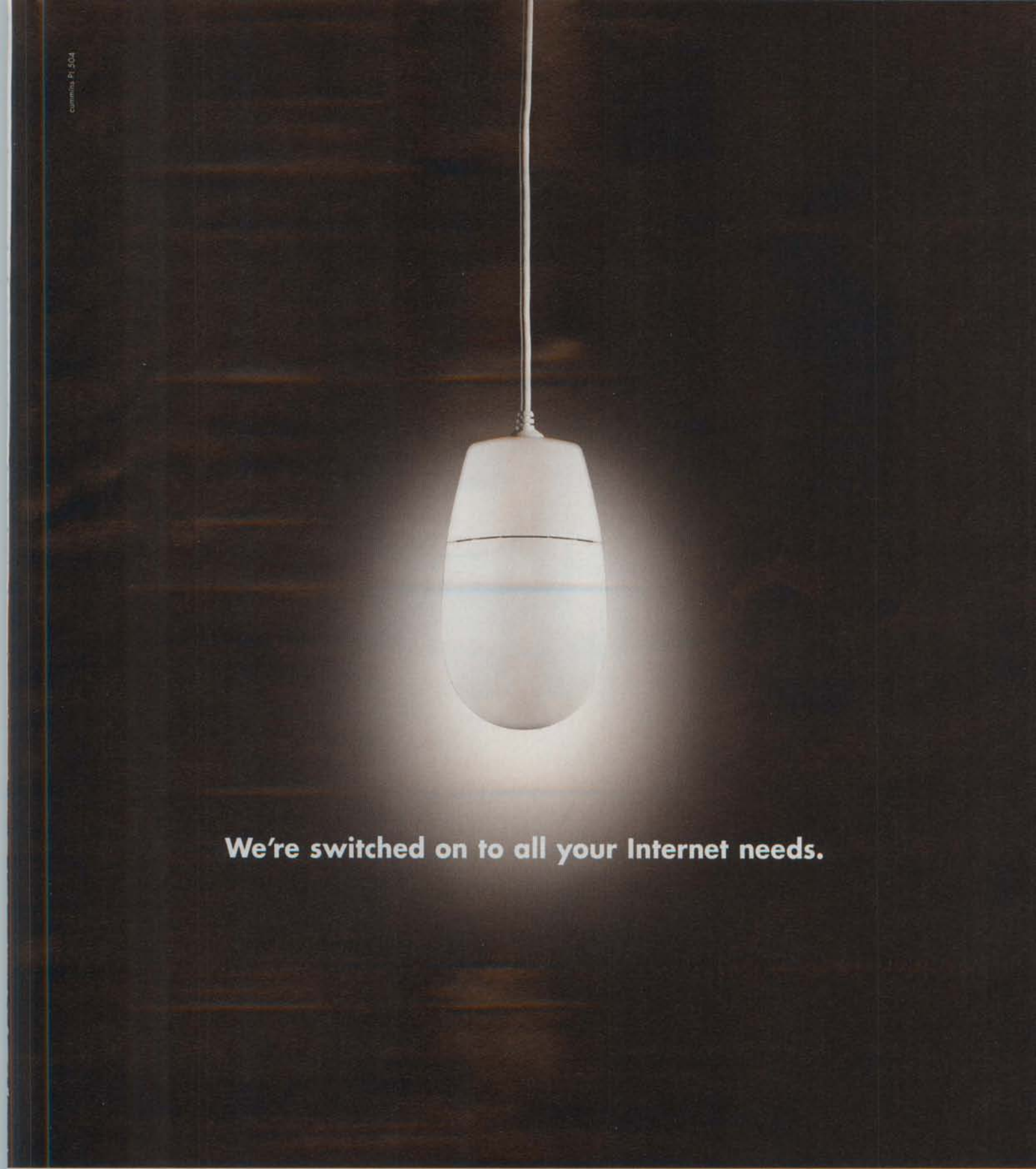
Problem three. Virtual Gate loads only into the system tray. This presents a range of problems. You can switch off the system and reboot, for example. Once there, you can alter the security privileges before the 30-second check period. Of more concern is the fact that you can boot into safe mode and uninstall Virtual Gate altogether.

Virtual Gate looks good, and may give some absolute tech-newbies a slightly warm feeling of security, but a warm feeling does not a security solution make.

Alex Kidman

Contact	Electronic Accessories Australia
Phone	(07) 5593 4442
Online	http://www.electron.com.au/
Price	$169
In short	Nifty but way, way too easy to break.

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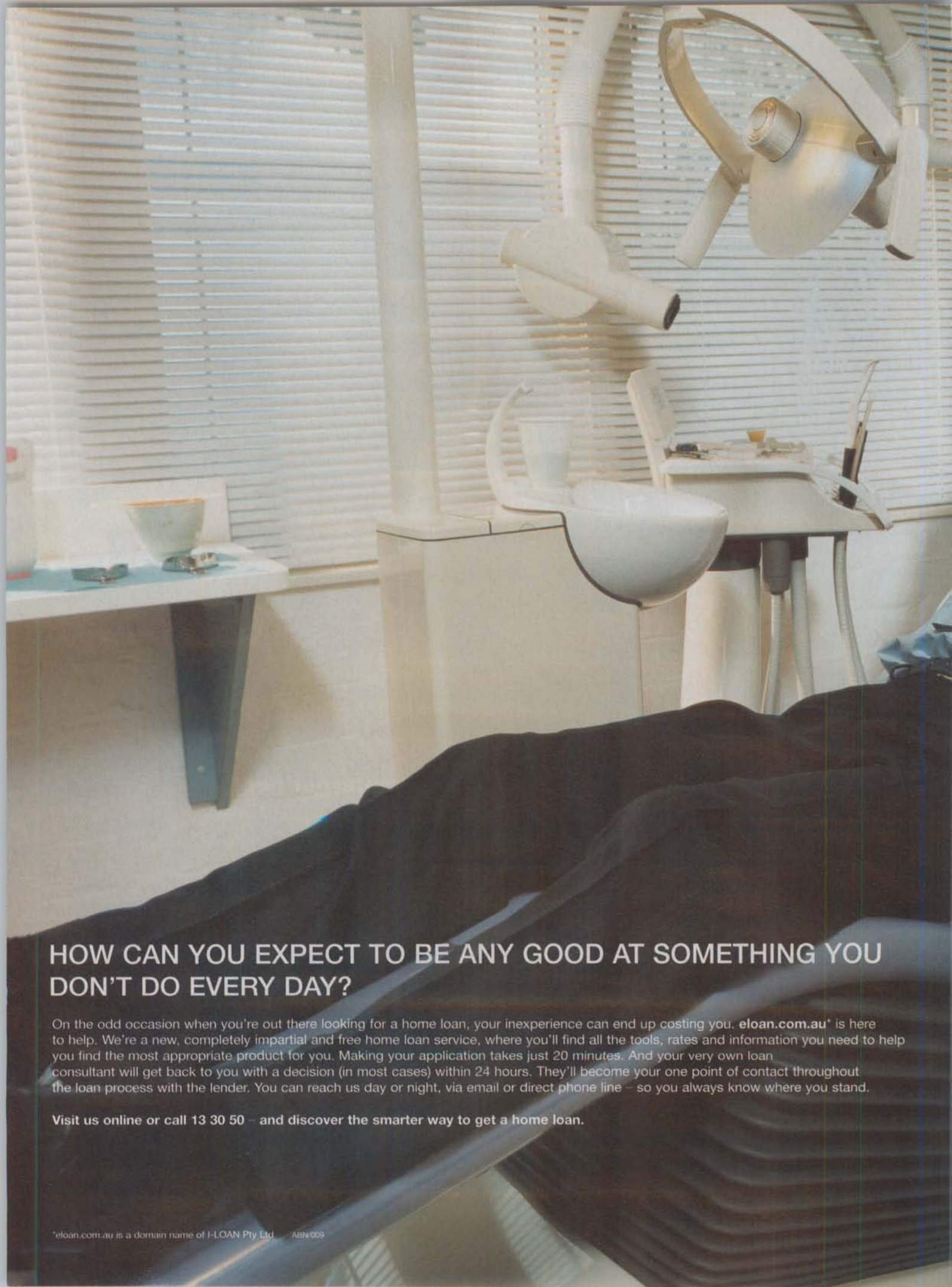
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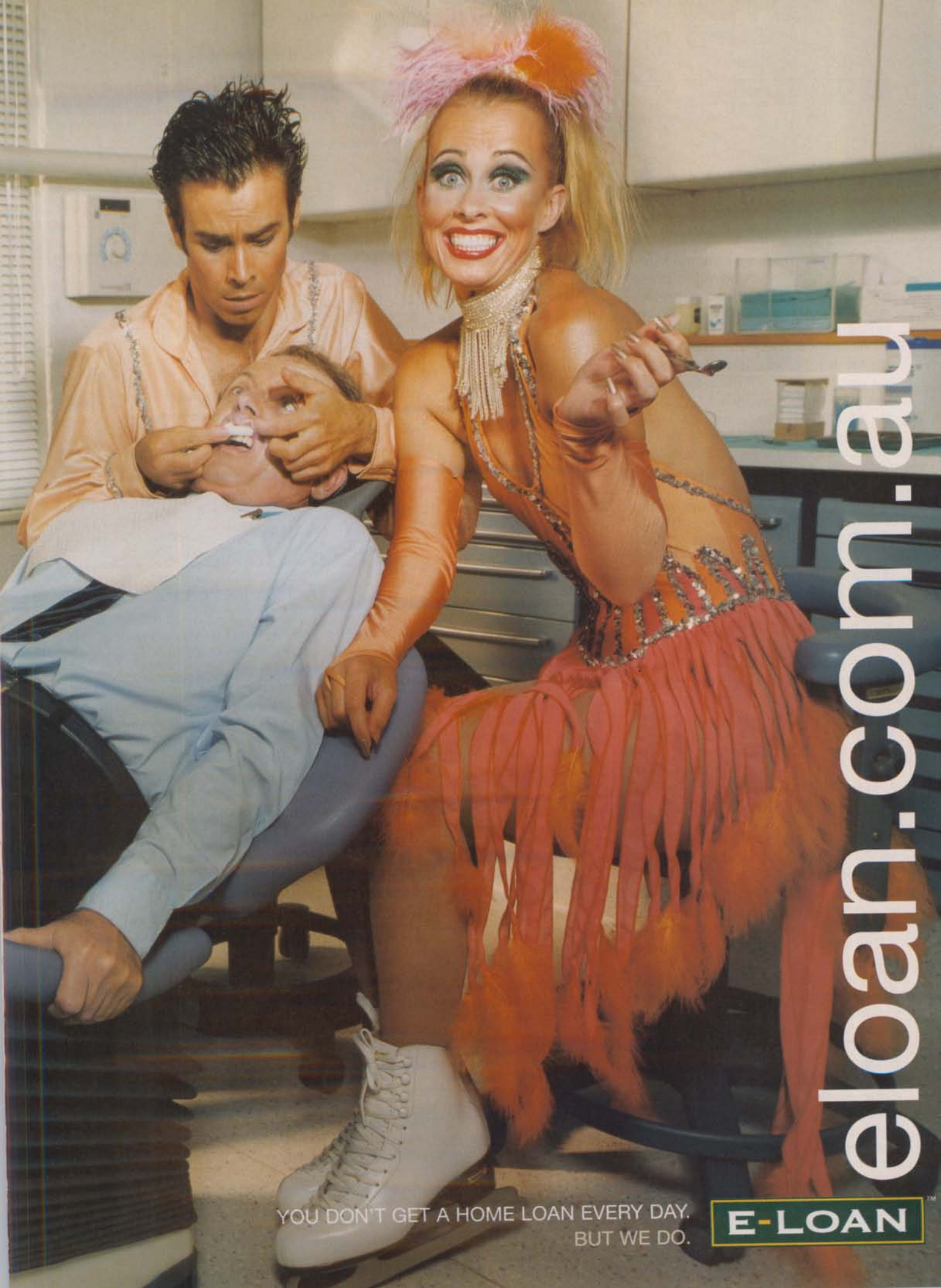


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Gateway Microserver

Setting up a network for a small business requires considerable expertise. The difficulty of setting up mail, file and Web services often calls for outsourced installation and management. Gateway, perceiving a gap in the market, has introduced the Microserver, a turnkey server solution delivering email, Web, file, firewall, DNS, IP masking and DHCP services from a sealed case.

It comes in the form of a toaster-size black box with a cute but largely superfluous green light on the front. The back of the box has two network ports, a serial port, a modem port and a small LCD for showing and setting the IP address (however, it will pick up DHCP addresses). Internally, it is run by a RISC CPU and a custom operating system. It comes with either 32M or 64M of RAM and a 10G or 20G hard disk (*APC* looked at the 64M/20G model).

Compared to most server solutions, the Microserver *is* easy to use, although it's not quite the 'just plug it in' solution Gateway is marketing it as. If you don't know what DHCP is, don't understand how Internet domains work or are flummoxed by TCP/IP port numbers, then some background reading may be necessary. The confusing manual is not a great deal of help.

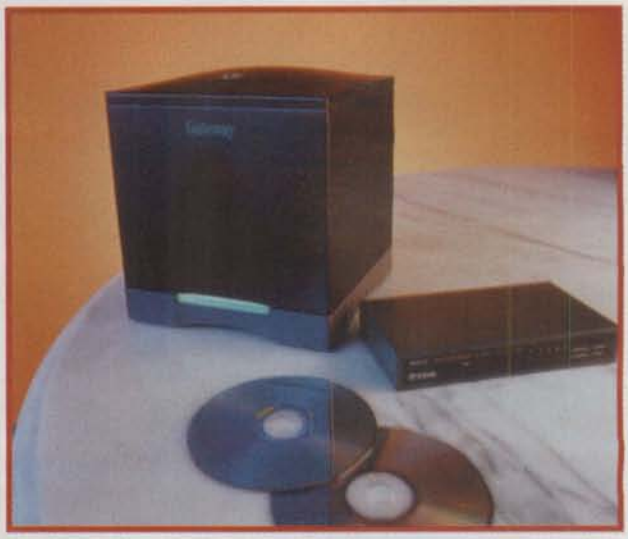
Somebody with only moderate technical skills could set it up very quickly. The administrative rules are easy to learn and the management interface — accessed though a Web browser — is not complicated.

The administrator can create users and manage services through simple HTML forms. The administrator site also allows real time monitoring of server load and usage.

The Microserver comes with an Installation CD (which will not work under Windows NT or 2000), but technically it is not necessary. Its main purpose is to automate the creation of links to the server. It is possible to create these links manually, so Windows NT/2000 users, and even users of other operating systems, need not be concerned. The manual only details how to create the links in Windows; users of other operating systems have to figure this out for themselves.

A server for all seasons

One of the Microserver's most valuable functions is its ability to operate as a gateway to the Internet for a small network. The internal modem can dial an ISP for Internet access, or a cable or DSL modem can be attached to the secondary network port for broadband access. Either way, the Microserver can share that Internet link with other devices on the LAN to which it is attached.



If this is the plan, appropriate DHCP and DNS services are simple to configure. The former requires a range of addresses it can dole out to clients requesting addresses, the latter requires forwarding addresses for DNS requests. The firewall services provided by the Microserver are very basic: filtering rules can be applied to ports, protocols and IP addresses. The more rules, the slower the data transfer.

As an email server, it's about as basic as you can get. Set up the domain, and you're away. Registered users have email accounts automatically created for them. Filtering rules are minimal — you can block certain email domains, but that's about it. Email size can also be restricted.

File sharing is enabled via SMB (Windows networking), AppleShare or FTP. Only basic configuration options apply: numbers of users (for FTP), maximum transfer size, volume sizes and so on.

The Microserver can also act as a Web server for internal or external use. Each user created by the administrator has their own personal Web page, which can be changed using HTML forms stored on the Microserver or by simply transferring HTML files to the server. The Microserver also supports FrontPage extensions, so people can use that Web site editor seamlessly. The administrator can set a central site based on the Microserver's domain, so public Web sites can also be served from the Microserver, although it only does basic HTML pages and simple CGI and Perl scripting — if you're looking for a database-driven Web site, look elsewhere.

A network in a flash

Although it does not come with backup software, the Microserver does have extensions that allow it to work with Legato software for system backup.

Because it has been designed as a turnkey solution, Gateway has included a 5-port D.Link Fast Ethernet switch and all the cabling needed to hook up four PCs to the Microserver. An instant network, and it's certainly not bad for the price.

The cost of this instant solution is $3,499, which is very cheap for a server that takes on so many functions. If you only want a server with 10G of hard disk space and 32M, the price is $2,999.

The simplicity of the Microserver is both a gift and a curse. It allows somebody who is not a qualified network administrator to set up and maintain a server — *APC* had it set up in minutes. On the other hand, fine-grained control of the server is not an option, and the lack of detailed control may be conducive to security holes. Additionally, the specifications cannot be changed, and the hard disk size limit may prove to be problematic in the medium to long term.

Nathan Taylor

Contact	Gateway
Phone	1800 500 734
Online	http://www.au.gateway.com/
Price	$3,499 (with 20G hard disk and 64M RAM)
In short	A nifty turnkey server solution.

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TravelMate 514T:
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HP 9100C Digital Sender

Hewlett-Packard's HP 9100C Digital Sender is based on a vision of a paperless (or at least less paperful) office where employees can share documents through email, fax and networks. It's certainly an interesting concept — an all-in-one device that can send paper documents as faxes, emails or files — but it fails to justify its substantial price tag because it complicates tasks that can already be performed quite simply.

The Digital Sender consists of a colour scanner unit about the size of a small laser printer, and a document feeder which sits on top. Setting it up is simple: plug it into the network, enter a few network settings and it's ready.

The Digital Sender has a dinky keyboard on which you can enter the email addresses or fax numbers of your intended recipients. It has its own internal address books, which saves you typing out all the addresses, and it can also hook into any LDAP (Lightweight Directory Access Protocol) servers on your network. The address books can be managed through the network using a graphical client on your PC.

The Digital Sender can send documents as emails, as long as you (or your ISP) have an SMTP mail server available. It can send them as faxes if you have a fax server. You can also send documents to computers on your network, provided those computers have the Digital Sender client running. You can send them to any printer that has JetDirect drivers. It scans documents quickly, and converts them into multi-page PDF or TIFF files at about 90K a page for black and white images and 160K a page for colour images.



APC wonders why you need the Digital Sender at all. Unless you already have a mail server, you can't use it to send email. Unless you have a fax server, you can't send faxes. If you have groupware such as Microsoft Outlook or Lotus Notes, you can already send emails and faxes, print documents and share them with your coworkers. Wouldn't you be better off buying a scanner and continuing to use your existing system rather than having to learn a whole new one?

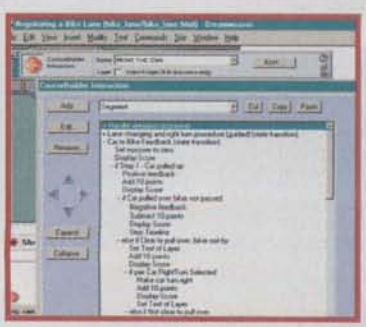
Although you don't need to use a PC to send documents, most people would probably find it easier to use their PCs than the tiny keyboard on the Digital Sender. And it doesn't do the one thing that would make the Digital Sender really useful: using OCR to convert your printed documents into editable text documents.

Josh Mehlman

Contact	Hewlett-Packard
Phone	13 13 47
Online	http://www.hp.com/
Price	$6,500
In short	Interesting idea, but why?

CourseBuilder for Dreamweaver

CourseBuilder is a visual authoring program that extends the capabilities of Dreamweaver, allowing you to create Web-based pages with interactive learning elements. This is achieved through templates for multiple-choice quizzes, drag-and-drop exercises, exploration and text entry as well as interactions using buttons, timers and sliders. Because of the complexity of some of the JavaScript, a version 3 browser is necessary for any learning applications you create.



CourseBuilder can also track and score a user's performance. The Knowledge Track feature allows information to be transferred to computer-managed instruction systems or saved in a database application such as Microsoft Access.

The need for coding is kept to a minimum, although some knowledge of programming procedures would help you understand the phrasing and logic used in the Action Manager. Default values for interactions can be changed with simple button-clicks or by altering field entries.

Much of the interaction building is done invisibly through on-screen wizards. When an interaction category is selected, additional tags that define the properties, elements and actions of the interaction are displayed. The fields in each section are clearly described and, if you are familiar with developing Web-based material, are logical and easy to follow. Interactions can be edited through the standard Dreamweaver properties control or directly from the code.

Multiple-choice interactions are easy to set up, but the default response to a choice is a pop-up message, which is distracting.

This can be changed, using the Action Manager, to a response display in frames, layers, status bar or text field. Explore interactions allow you to explore onscreen objects by clicking on hot areas to initiate a predetermined action (eg. mouseover swap image files). Combining text and images in this way could be an effective learning tool.

Drag and drop is a simple matching task where you drag an image to another target image. This interaction could be developed to simulate construction tasks, and all the interactions share flexibility in editing. The Text Entry interaction could be useful in surveys or responses to elements in commercial Web pages.

Pamela Roberts

Contact	Macromedia
Phone	(03) 9853 0900
Online	http://www.macromedia.com/
Price	Coursebuilder $359, $928 bundled with Dreamweaver 3
In short	Great for Web-based learning.

Packard Bell Spirit Z

Like several other manufacturers, Packard Bell is pushing the boxless executive PC concept, based on an LCD screen and not much else.

The Spirit Z is a powerful machine in its own right, using a 500MHz Pentium III processor with a ZX chipset, a generous 128M of SDRAM, a 10G hard drive and built-in 10/100BaseTX networking. The specs are only half of it though.



The the Spirit Z is biased towards the aesthetic rather than the functional. The designers have taken a more ergonomic approach than Gateway's Profile, and put everything you need on the front — floppy slot and DVD drive, speakers, power switch and indicator lights — rather than on the sides. Consequently, the Spirit Z is slightly thicker from front to back than the Profile, but its two-tone grey casing seems better balanced on the desk. In terms of connections, PB has also done the user proud: printer, VGA, microphone, line in and out, four USB ports, serial port, mouse and keyboard mini-DINs, network socket, an unidentified RCA phono out (the manual is rather skimpy in several areas), an IrDA window and two PC Card slots all hide behind the front panel. There are no expansion slots.

Although no internal modem is fitted, a PC Card modem is bundled with the system in case you need it. The designers have thoughtfully included a built-in cable tidy should you decide to plug a connection into every port.

The whole plot rests very stably on the rounded power supply/base. Packard Bell supplies a USB mouse, but the final gloss on the Spirit is the fully remote keyboard, powered by two AA batteries. You simply point it at the screen and type. Its infra-red system works well, even at acute angles or when very close to the main unit. To make things even easier, the keyboard has a couple of thumb pads on either end, which duplicate the mouse action, allowing you (after a little practice) to run presentations as you stroll around the room. The keyboard also has a host of dedicated function buttons, including the usual WWW, email, sleep, CD player, mute and volume. The Spirit's 15in TFT display is more than good enough for everything the average executive is likely use it for, and although the speakers aren't exactly hi-fi, they are fine for playing CDs.

Jeremy Torr

Contact	NEC Computers Australia
Phone	02 9700 5000
Online	http://www.nec.com.au/
Price	$5,199
In short	Great looking, heavily featured, but long on cost and short on expansion.

D-Link DSB-R100 USB Radio

It's taken quite a while for USB to really take off — after all, a couple of years ago it was 'the next big thing', but it took time and a decent installed user base for USB devices. D-Link's latest USB device initially seems a little odd — a USB radio. With a plethora of local and international radio stations already broadcasting online, is there really a place for a USB radio?

The first, and most obvious advantage is that it doesn't rely on being online — it just needs to be within range of at least one radio station. There's also no dropout in the download stream — it's absolutely live.

The unit itself is pretty ugly: a clear assembly base and a plug-in antenna. The antenna connection is a standard RCA plug port, so it is possible to install a different antenna.



Installation of the radio is about as easy as it gets. Plug in to USB and soundcard line in, install drivers, and you're away. The installed software does what you'd expect a digital radio to do — it scans and stores stations, sets alarms for waking and sleeping and controls volumes. Radio programs can be recorded to hard drive as wave files, and an included MP3 compressor allows you to crunch files further down. Files captured and crunched tend to be a little soft on playback, and you end up with any radio reception defects in your final product. The software itself has a chunky look, with the largest pop-up help *APC* has ever seen.

If there's a problem with the D-Link USB radio, it's that it attempts to get radio (a broadcast medium) near a computer (which lets out a reasonable amount of electromagnetic interference). Therefore, as with any radio, the quality can vary quite a bit. For example, testing the unit in Sydney (possibly Australia's largest radio market) *APC* could only get satisfactory listening quality from six stations on the FM band. The low quality of signal made the scanning function jump stations, although if we knew exactly where on the band a station should be, we could usually listen with similar quality reception to that provided by an in-car stereo.

Overall, the D-Link USB radio is fun to use and listen to, but unless you can get good reception, or you're desperate to illegally record your favourite DJ in MP3 format, *APC* recommends picking up a portable radio.

Alex Kidman

Contact	D-Link
Phone	(02) 9417 7100
Online	http://www.dlink.com.au/
Price	$59.95
In short	A gimmick radio.

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DC-30C5U	3 Mtr Cat-5 UTP Cable
DC-50C5U	5 Mtr Cat-5 UTP Cable
DC-100C5U	10 Mtr Cat-5 UTP Cable
DC-C5U	Cat-5 UTP Cable Extender
DC-C5UX	Cat-5 UTP Cross Over Adapter

Universal Serial Bus

DSB-H4	4-port USB Hub
DSB-H3SP	3-port USB Hub with 1 x Parallel and 1 x Serial Port
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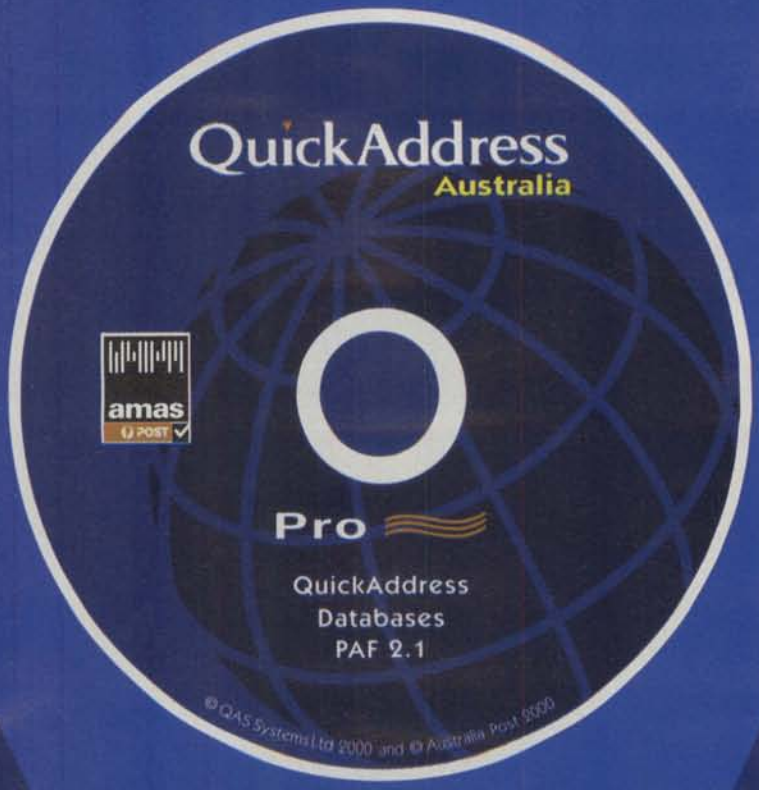
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APC101

Forum

We welcome comments and suggestions. Send correspondence to *APC* Readers' Say, PO Box 37, Sydney 1028, or email APC@acptech.net.
All correspondence becomes the property of *APC* and is subject to editing.

Deja vu

Have just been reading the latest (March) *APC* and thought I'd write after noting you must be low on letters.

While reading the Forum section I got the distinct impression I'd already been through the material before. It took me a while to pin it down, but I eventually pulled out last month's mag and there is was in its entirety. What gives? Didn't you have enough material?

Tim Smith
Devonport, Tas

Ed note: *Owing to a printing error, the March edition of Readers' Say reproduced the February letters. To make up for it, we've supplied an extra big Readers' Say this month.* APC *apologises for the mistake.*



Support for Net censorship

I thoroughly enjoyed Geoff Ebbs' column 'Wake up, it's your Web' (see *APC* February, page 50). He appears to have his finger on the pulse of where the vested interests of the commercial world are attempting to gain control of the Web. Thank you, Geoff, for pointing out the dangers inherent in us jumping on the freebie bandwagon.

However, I was dismayed to see that Geoff linked the attempts at censorship by the Australian Government to these vested commercial interests that wish to corner the Net for their own profit. I know that I am in the overwhelming minority, but I support censorship of the Internet. I encourage my children to use the Net for study and entertainment. The battle that I have to keep their minds uncorrupted by the filth that is pushed by spammers is one that many parents won't enter into. I have friends with Internet access who disallow their children access because of the dangers involved.

This is one topic that the Net community needs to think through before voicing concerns about the deprivation of voyeurs. It's not until the Net is cleaned up that it will expand into most family homes — only then can it evolve into the grand tool which we are all eagerly anticipating.

Daniel Forrest
Augusta, WA

Optus 'yes'? No.

Your correspondent is right on the mark (see *APC* February, page 53). His experience is entirely consistent with my Optus Internet experience here in Nowra (NSW) until I dropped them last October. I was an OzEmail customer for many years, from when it had just a few POPs in the capital cities. Around February/March 1999, it started screwing me around (it seemed to have lost the plot on customer loyalty issues), so I walked. To Optus Internet. But let me qualify that by saying that the OzEmail connections were *always* top notch.

From day one Optus Internet was chaos: constant dropouts and unreliable connections. A frequent and frustrating experience was when I dialled in and the remote modem answered, but never completed handshaking. Net result, another wasted local call, which increased my phone bill by 35% over six months.

When I raised my problems with the OptusNet techs, they concluded it was: the Telstra line; my modem; my modem's settings; my computer's settings; and, on one occasion, sun flares. When I mentioned that my previous OzEmail account never had these problems they suggested that the modem must still be using OzEmail's initialisation strings. I asked that they recommend a modem. They did

THREADS from *APC*'s Web sites

The release of Windows 2000 inevitably provoked a large number of responses on *APC* discussion boards. Although Windows 2000 has generally been praised as one of the more stable Windows releases in recent history, there's a strong sense that it's unnecessary, overdeveloped and overhyped ("Spare me! Bloatware would be a compliment," noted one poster). Some people are turning to open source alternatives:

I'll give it six to nine months to be sorted out before I'll consider it, as it has too many 'Unknown' bugs for the money they are asking for it. In the meantime I am looking at Corel Linux.

Many existing Windows users appear to be concerned about Windows 2000's hefty memory requirements, and inability to run on older processors. Even some well-equipped NT operations seem cynical. Graham Murfett wrote:

As a small organisation running around 20 NT 4.0 workstations on a NT 4.0 Server network, we will not be falling over ourselves to upgrade to 2000. The only real shortfall is NT 4.0's inability to run USB. We have a 4½-year-old Digital PC with two USB ports with nothing to do. In this instance, "it ain't broke".

However, some people are happy to face the pain of upgrading:

I have always been very interested in NT's stability & security even if it is a pain to install new hardware and sort out the blue screen issue. I will, when the first service pack comes out, be purchasing Win2000. A piece of software with Plug and Play and NT's security, now that has won me over!

Continued over page

Correction

In the January issue of *APC*, incorrect specifications were listed for the Magtron XJ-810 monitor (page 94). The correct dimensions of the monitor are 42.1 by 42.3 by 43.3cm (h by w by d). *APC* regrets the error and any incovenience it may have caused.

(MyModem/Banksia), and I bought it. Alas, it made no difference. Another $200 down the hole.

Then came the *APC* ISP review last year. The Optus Internet review largely confirms my experience. One other review was for dingo blue. Oddly, both Optus Internet and dingo blue, as I understand, are part of Optus, yet the *APC* review of dingo blue was a little more favourable. I had also heard that dingo blue was delivering a good service from its Nowra POP.

So, albeit with some apprehension, I gave Optus Internet the flick and joined dingo blue last October. How is it? Great. It's $25 a month for all I can eat; there is a 1300 number in case of local difficulties (I have only used it once); it has good, reliable connections, great tech support, no advance payments . . . I could go on.

But the question remains: given the Optus Internet and dingo blue relationship, why is one so woeful and the other so good?

Pierre du Parté
Worrigee, NSW

Defending Microsoft

Although I am by no means a fan of Microsoft, I am nevertheless appalled at the constant vicious attacks on this company from every direction, culminating in the recent US Department of Justice (DOJ) trial and its adverse findings against Microsoft.

In *APC* January, page 22, **Newswire** reported on some conclusions reached by Judge Jackson, which I find to be blatantly unjust and unfair. For instance, he said Microsoft enjoys a monopoly because its share of the Intel-compatible market is extremely large and stable. So what? Many companies enjoy similar market share because they produce the goods consumers want. Coca-Cola comes to mind; I don't see the DOJ crucifying Coke for being the most popular soft drink or using aggressive marketing policies.

Judge Jackson said that Microsoft's dominant market share is protected by a high barrier to entry. Nobody is holding a gun to anybody's head and forcing them to buy Microsoft products. As long as there is one other operating system, word processor, database, or other competing product out there, Microsoft does not enjoy a monopoly. Microsoft can charge what it wants and if the price is too high, people will buy another product. In a free society, there should be no debate about the right of any company to enjoy market-driven success.

The judge also claimed that because of this allegedly high barrier, Microsoft's customers lack a commercially viable alternative to Windows. Again, so what? Unix is not viable? OS/2 is still around and I haven't heard of Apple going belly up. Not only that, nothing is preventing anybody from writing an operating system to go head-to-head with Windows. Some years ago there were many alternatives to Windows and many DOS-based operating systems, but most fell by the wayside. Why? Simply because Microsoft invented the better mousetrap and the world beat a path to the door of Bill Gates, and quite voluntarily. According to this judge, it is now a crime to have a product that is wildly successful.

The worst aspect of this farce is that there is talk of forcing Microsoft to release source code for its products. If this actually occurs, it will be one of the greatest acts of legalised theft ever seen, akin to making Coca-Cola reveal its closely guarded drink formulas. Microsoft owns its source code and nobody has the right to compel it to reveal its valuable industrial secrets.

The best thing that could happen is that a viable operating system which works better than Windows will be launched, along with huge developer support, but until then Microsoft should have the right to sell its products without harassment as long as people are prepared to buy them, and market them as aggressively as possible.

Ziggy Malter
Internet

Spies like us

In response to your story 'ASIO extends hacking powers' (see *APC* January, page 20), is there nothing better for ASIO to do than hack into people's computers? What could we possibly have that it would need to hack? We live in a sorry world when private citizens must still be 'observed'.

I suppose we shouldn't worry about this little thing, as we freely give out our details every day, whenever we make purchases with credit cards, register cars, pay accounts, open bank accounts and so on. There is a plethora of shops, government departments, and financial and insurance companies with details of everything we do.

Greg Poulter
Internet

THREADS from *APC*'s Web sites

Other threads have included such strange topics as suing Microsoft for economic damages caused by the dodginess of Windows, conspiracy theories about banning online gambling, speculation on why there was less advertising than usual in *APC*'s February issue, much discussion about the stickiness of glue on cover CDs and a proposal for *APC* centrefolds. When Angus Kidman argued in his DisGust column on **Newswire** (http://.newswire.com.au/disgust/) that the willingness of people to believe a widely circulated email which claimed KFC used genetically mutated beakless chickens showed that "everyone in the world is a credulous fool", a lively debate ensued. One contributor noted:

It is not that people are getting dumber, with easy access to mass communication it is now just more apparent how many dumb people there are! It shows how many are prone to a conspiracy theory, no matter how easily disproved or far-fetched. It provides a distraction from the humdrum of modern life.

Others were less conciliatory:

***Isn't this just another* case of bashing email/the Internet? This story would fit well in the *Enquirer* or *Ralph* magazine. Gullible people are just as *likely to believe it* in those questionable publications as they would in email.**

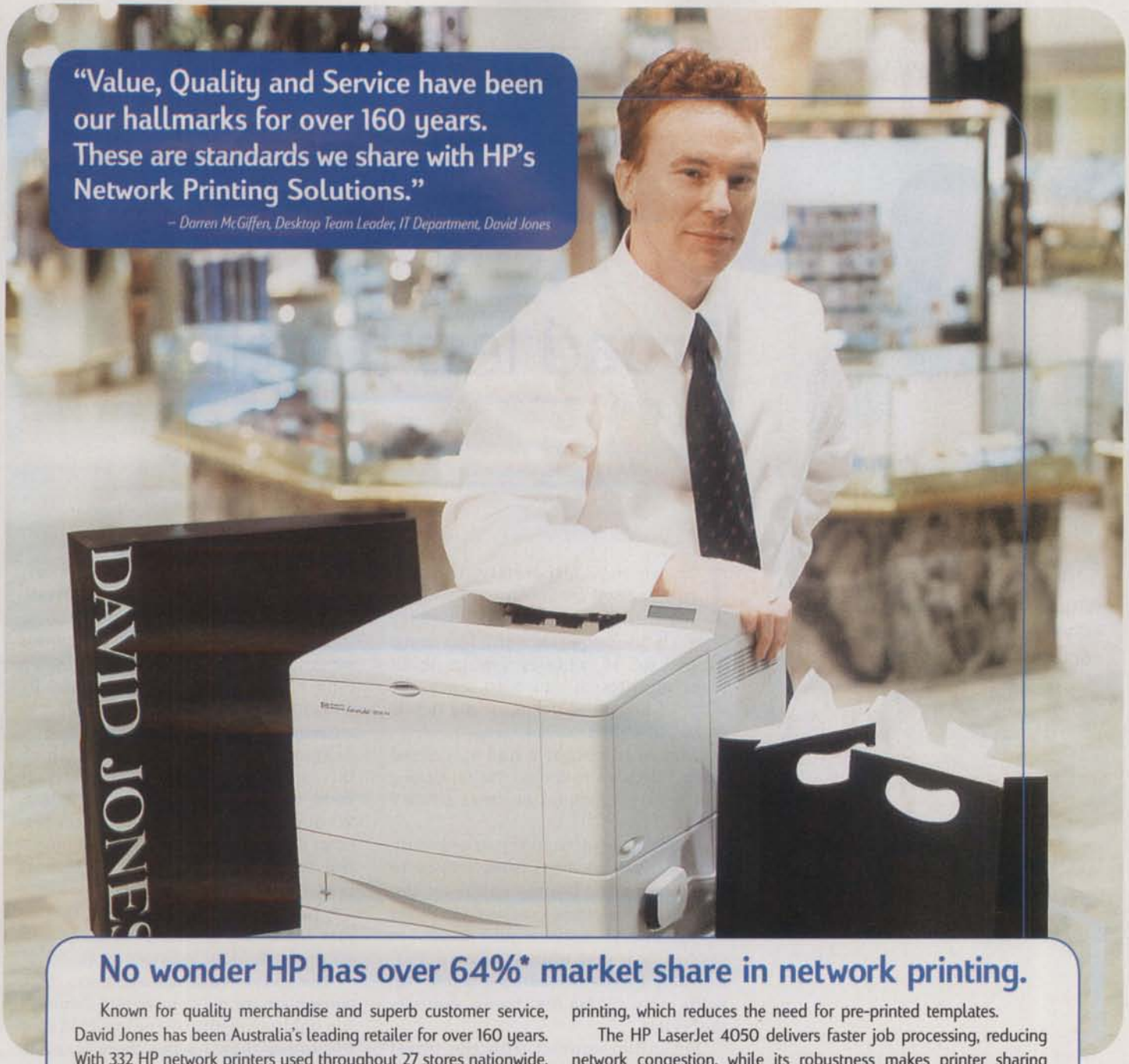
The importance of not flooding the Net with dubious emails was also noted:

Don't propagate this rubbish by sending it on, even if you believe it.

Want to put across your view, or see what other readers have to say? Join the discussion at http://apcmag.com/interactive/ and http://newswire.com.au/sboard/.

APC competition winners

The winners of the February *APC* CD comp are: Steven Eccles (Electrona, Tas), Brendan Tuppack (Greenslopes, Qld), John Barber (Port Macquarie, NSW), Karim Amin, (Belfield, NSW), and Ken Dowling (Melbourne, Vic). They will each receive a copy of Adobe PhotoDeluxe Home Edition 4.0.



No wonder HP has over 64%* market share in network printing.

Known for quality merchandise and superb customer service, David Jones has been Australia's leading retailer for over 160 years. With 332 HP network printers used throughout 27 stores nationwide, HP is integral to their business. Recently, they have been evaluating the HP LaserJet 4050 network printer as the standard to be used as older printers are upgraded.

The HP LaserJet 4050 printer's Stored Jobs feature allows large files, like detailed reports, to be stored on the printer. Staff key in the PIN codes before they leave the office and the files are printed overnight. Coupled with the duplex accessory, this has increased productivity and lowered costs, as well as reduced paper usage by 1/3. This feature also facilitates in-house on-demand printing, which reduces the need for pre-printed templates.

The HP LaserJet 4050 delivers faster job processing, reducing network congestion, while its robustness makes printer sharing problem free. Currently, all David Jones network printers are managed remotely from Sydney with HP's JetAdmin software.

The latest HP Web JetAdmin 5.5 version will make it even easier for David Jones to install and monitor printers remotely.

Although the various departments in David Jones have diverse needs, "the versatility and unique features of the HP LaserJet 4050 meet them all," says McGiffen. For an HP Network Printing Solution that gives you more returns, call 1300 364 766 or visit HP on the web at www.hp.com.au

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HP JetDirect Print Servers

webJetAdmin

Network Printing Solutions

The HP Duplexer, Private Printing and Stored Jobs features are available as optional upgrades. *Source: 1. IDC Asia/Pacific Print Server Semi-Annual Study (January to December 1998) shows HP has 64% market share in the category for Australia. 2. Printers with print servers are network capable, and is a fair industry definition to estimate market share in the network printing industry.

HP315/27



Angus Kidman

Angus Kidman is ACP Tech's Web editorial director. He can be contacted at akidman@acptech.net.

Purchasing travel online is about as much fun as root canal therapy, but technology isn't to blame.

Eroad less travelled

I'm racing desperately through crowded Sydney streets on a sweltering Friday afternoon. In my hands I have a bank cheque for which I have just queued for 15 minutes. I have about three minutes in which to reach the office of my travel agent, or my tickets will be cancelled.

This wasn't what I had visualised when I decided to forego the telephone and book my annual overseas holiday online.

I had no idea it would be so awkward. I regularly book trips from Sydney to Melbourne using Qantas' online system, and it's far easier and quicker than doing it by phone. However, what I'd failed to appreciate is that while booking a journey may be easy, booking a whole trip (with extra flights and bonus sightseeing) is not.

My initial contact with the travel agent went quite swimmingly. I supplied the dates I wanted to fly and the initial booking was made. However, because the ticket I booked included $150 worth of free sightseeing, I had to specify what I wanted to see.

Could I find a list of this online? No, I couldn't. A list had to be faxed to me, and this only happened after three phone calls. So much for the power of email.

That was only the prelude. Two days later, I got a phone call telling me that the ticket had to be paid for that day, or it would be cancelled. Could I pay by credit card? No. The agency preferred bank cheques. If I did use a credit card, they'd charge an extra 2% of the fare, and I'd still have to bring the card into the office to verify my signature. Hence my sweaty and very annoying race through the streets of Sydney.

It didn't end there. Three days later, I got emailed a neatly formatted HTML receipt. There was just one slight problem: it included charges for all the items I was supposed to receive for free. More frantic (and now barely civil) phone calls. By now, I really needed the holiday, just to recover from booking it.

Despite all these travails, I don't think this experience proves that ecommerce is dead, or dying, or even mildly crippled. What it does prove is that most site operators don't have a clue about the potential to adapt their existing business models to take advantage of the power of the Net. In far too many cases they've just taken an existing business and slapped a dubious interface on it.

Not only would it have been more convenient for me to have had details of the sightseeing attractions included on a site rather than having them faxed to me, it would have saved staff time. Rather than having to ring to complain about the invoice, a simple 'query this invoice' function would suffice. And why on earth couldn't I pay for the ticket using a secure interface? (I'd have taken my chances and paid by email to avoid that horror trip across town.)

Analysis of ecommerce — why it's working, why it isn't — has become a profession of sorts, for everyone from stockbrokers to developers. It's easy to assume that concerted denial of service attacks have undermined public confidence, or that no-one will buy goods they haven't seen. Very few ecommerce wannabes, however, are happy to face a more fundamental truth: they'd get more business and more visitors if their sites even vaguely lived up to the promise of something that was faster and more convenient.■

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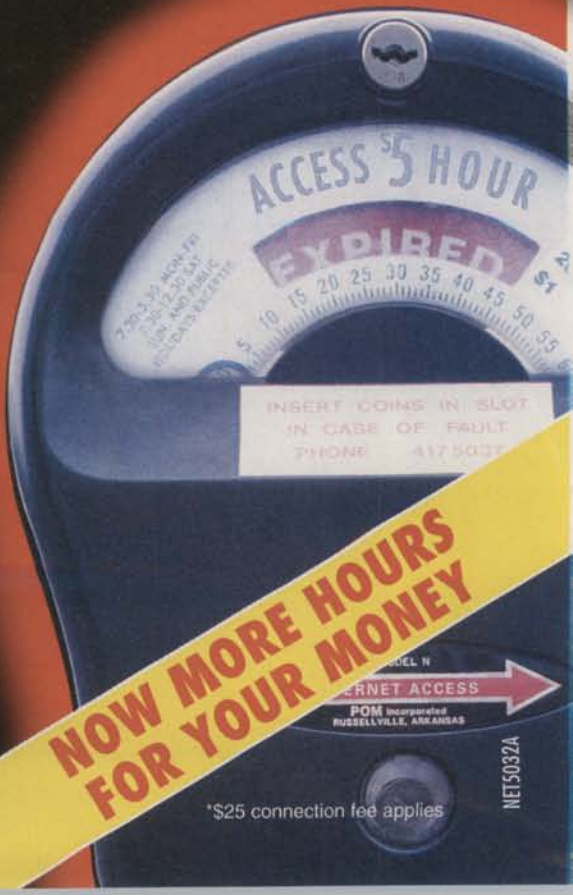
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IT companies are switching their investment policies to ensure continued economic dominance.

Shifting the balance

Jeremy Horey

Jeremy Horey is a senior consultant with Com Tech Online. He can be contacted at jhorey@comtech.com.au.

A shift is occurring in the balance of power in the economy towards IT companies. And some of those companies are turning into giants that will dwarf other multinationals.

Over the years, different sectors in the economy have been influenced because they fulfilled some strategic role. It was oil companies during the '70s, and now it is the turn of computer technology businesses.

In the last four years, investment by businesses in computer technology has really paid off. During the '70s, '80s and most of the '90s, computer technology did not deliver returns to businesses in proportion to their investment. It always seemed that just a little more investment would see all the cost savings that management hoped for. But that little extra investment turned into just a little more and so on. Businesses became heavily dependent on IT but were unable to quantify just what they were getting for all the money they spent on software and hardware.

That has changed. Businesses can now install new IT systems and get returns within months that more than pay for the software and the installation. These savings flow from changes that allow the business to operate more efficiently and reduce costs permanently.

This sort of return gives businesses that build and install such systems a key role in the economy. This is reflected in the stock market, where IT companies are leading rising markets.

The biggest winners are a handful of computer technology companies that are becoming very powerful.

For instance, according to Microsoft's last annual report it had an income of nearly $US8 billion on a revenue of just under $US20 billion. The company has only 34,000 employees, so what does it do with all that extra money?

One of the things that Microsoft does is invest. Hardly a day goes by without news of some new 'equity stake' from Microsoft. As well as investing in upcoming Internet ventures, it also invests in a wide range of technology and content businesses.

It's not only Microsoft making this large-scale strategic investment. Intel and several other wealthy US technology companies are using their money to invest in new businesses and 'partners'.

Usually these investments are minority stakes. However, they are always significant enough to give the investor a say in the running of the business and the deal may include the partner adopting the investor's technology.

Of course there is nothing new in companies investing excess profits in other businesses. It makes a good insurance policy. If sometime in the future the investor needs cash, it can liquidate its stake.

What is new is the scale on which this is happening. It is estimated that Microsoft is buying into about 150 companies a year.

A few have been swallowed up whole, but Microsoft only does this where the target company can add a product to the Microsoft stable. A recent example of this is graphics software developer Visio, which was taken over by Microsoft late last year.

As the leading computer technology companies accumulate vast wealth, they use that wealth as leverage to move themselves into an even stronger economic position. Their investments spread out, making them the centre of a web of companies involved in all areas of IT.■

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Mining companies and Internet startups are joining forces to cash in on soaring high-tech stocks.

Blue sky mining

Helen Dancer

Helen Dancer is the editor of the *Bulletin's* e-bulletin section. She can be contacted at hdancer@acp.com.au.

Banks and free ISPs, content providers with infrastructure businesses, and mining companies with anyone whose name ends in .com. The end of the 20th century and the beginning of this one have been characterised by the making of strange bedfellows indeed.

No merger better typifies the old world meets new world mania than the announcement in January of the marriage between entertainment company Time Warner and Steve Case's communications giant America Online (AOL). A few years ago, Time Warner merged with Ted Turner's CNN. This partnership had a winning combination of content, communications, infrastructure and customers, or 'eyeballs' as the industry describes them.

AOL and Time Warner saw the opportunity to corner an emerging market and grab market share. AOL has a proprietary attitude to its customers and Time Warner plans to offer them enough content so that they'll never want to leave anyway.

Leaving behind the mutual attraction between content providers and communications businesses, there's an intriguing relationship building between mining companies and Internet startups. This is another case of old world meets new world, but the motivations are different. For example, a mining company is behind one of Australia's most successful ecommerce sites, Wine Planet (http://www.wineplanet.com.au/). It secured its stake the year before last in a curious reverse takeover. The Welcome Stranger mining company took a 95% ($3.5 million) stake in online security business CommSecure, while Chile Minera successfully invested in share-trading software business Timemac, taking a 100% stake for $1.6 million. So what's the reason for this phenomenon?

The answer doesn't depend on the parties involved having common interests or complementary markets. It lies in precisely what has made Nasdaq so volatile in the last quarter of 1999 and the first quarter of this year — the over-inflation of tech stocks and the tendency of punters to punt. Mining companies have always been a high-risk investment, attracting those with capital and the expectation of high gains. Sound familiar? The same can easily be said about the average Internet startup.

With commodity prices in the doldrums, mining companies are casting around for opportunities to keep their investors happy and have hit upon the burgeoning Internet industry to supplement the poor performance of their main investment base.

Australian Internet companies, which — unlike their US counterparts — struggle to attract investment capital, have leapt at the opportunity, mindful that once resources prices pick up they'll be discarded as fast as last year's Christmas cake.

So far, it has been a marriage made in heaven, at least on the bourse. Chile Minera shareholders would have been pleased with the 400% increase in the share price since the company invested in Timemac. Kilkenny Gold, which invested in OzEmail's high-speed broadband technology, has seen a 188% increase in its share price since its investment, while the Welcome Stranger investment in CommSecure has seen its share price increase by 285%.

While the rest of the world shakes its head over the madness of the stock market, speculators are striking gold in Internet shares.

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If you're in the market for a new hard disk drive, hunt around to make sure you get the best deal.

Hard and fast

Hard disk drives are one computer component that you're likely to upgrade before your entire system becomes obsolete, and there are a couple of good reasons why. First, like most storage devices, hard disk drives contain fragile moving parts that operate at high speed. This makes the average hard disk drive more susceptible to failure than, say, your video card or motherboard. Second, you're likely to replace your hard disk because of size. Software developers tend to see decreases in the cost of memory and storage capacity as a green light to make their applications larger. You need only look at the giddying leap in the size of the average installation of Windows 3.11 when upgrading to Windows 95 for evidence. This trend applies across the spectrum of software applications, especially games and office packages.

It's easy to be dazzled by technical specifications, but remember that your hard disk only contributes to about 5% to 10% of your overall system performance. Even if you buy a high-performance drive, you may not notice an improvement at system level (especially if you have an older system) because many systems can't support the capabilities of newer drives. Hard disk performance is also improving more gradually than other types of hardware. When a new development occurs, it's passed on to shelf products quickly. The previous generation of drives is likely to be sold out before you have the chance to decide whether you're going to pay extra dollars for the new technology.

Recent improvements in the ATA (or IDE) interface illustrate these points. ATA is the most popular interface standard for connecting hard disk drives to desktop systems. For a long time, the most advanced ATA interface, ATA/33, could support a maximum burst transfer rate of 33M per second. Its successor, ATA/66, is (theoretically) capable of twice this speed. *APC* found that most drives on the market support Ultra ATA/66, even though only the latest motherboards can. Sillier still, the 'maximum burst transfer rate' only lasts the few seconds it takes to clear the hard disk drive cache; even the fastest drives are incapable of the 'sustained' rate of data throughput required to swamp an ATA/33 interface. If you have to decide between ATA/33 and ATA/66, choose ATA/66, if only to ensure your drive isn't inadequate when you upgrade your motherboard.

About Price Watch

Each month, Price Watch examines variations in retail pricing and service. Investigations are conducted anonymously, either by telephone contact with retailers or through pricing details supplied on their Web sites. Prices and specifications provided here are as quoted by retailers; while we assume these are correct, we cannot accept responsibility for errors or omissions. The responsibility rests with sales staff to provide adequate information, as their employer would expect them to do with every customer. Readers are advised to always obtain a written quotation prior to making any major technology purchase.

One of the most distinguishing feature between drives is spindle speed and capacity. Spindle speed is measured in revolutions per minute (rpm), and most drives are either 5,400 or 7,200rpm. Drives of 7,200rpm are more expensive because they can pull data from the disk more quickly, allowing them to achieve higher sustained data transfer rates. If storage capacity is at the top of your priorities, make a quick megabyte per dollar calculation to make your choice.

As hard disk stock moves fast, prices reflect market demand fairly accurately. If you choose a specialist retailer with high turnover, you can be confident you're paying a reasonable price for your drive. *APC* found a couple of surprisingly good deals from smaller specialist retailers, so it's worth hunting around for a bargain.

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	.com.au/	IBM DeskStar ATA/66	7,200	20.5G	$435
		IBM DeskStar ATA/66	7,200	34.0G	$725
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	http://www	Seagate U8 ATA/66	5,400	8.4G	$399
	.harveynorman.com.au/	Seagate Medalist ATA/66	5,400	13.0G	$499
Westgate Technology	(02) 9898 0277	Fujitsu ATA/66	5,400	6.4G	$220
		Fujitsu ATA/66	5,400	8.4G	$250
		Fujitsu ATA/66	5,400	13G	$310
		IBM DeskStar ATA/66	7,200	20.5G	$425
Harris Technology	1300 139 999	Quantum ATA/66	7,200	9.1G	$270
	http://www.ht.com.au/	Quantum ATA/66	5,400	10.2G	$250
		IBM DeskStar ATA/66	7,200	13.5G	$303
		Quantum ATA/66	5,400	17G	$282
		IBM DeskStar ATA/66	7,200	27G	$496
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Do you pay more for phone calls to your ISP than for your actual monthly subscription? **By Roulla Yiacoumi**

Hanging on the telephone



When ISP One.Net first came onto the Australian market just over two years ago, *APC*'s Service & Reliability was inundated with complaints. One.Net customers complained that while they were paying $19.95 a month for 50 hours' access, they regularly paid at least that amount again attempting to make a successful connection to the ISP.

Readers told Service & Reliability they constantly encountered poor connections that dropped out every few minutes, as well as continually engaged phone lines.

In *APC*'s Annual S & R Survey 1998 (see *APC* August 1998, page 71), 75% of those who left One.Net did so because of poor access and performance. To One.Net's credit, it took notice of customer complaints and overhauled its network. In the 1999 survey (see *APC* November 1999, page 124), 75% of One.Net's customers who responded said they rarely or never encountered busy signals and more than 70% said they rarely or never experienced line dropouts.

Are other ISPs taking the same notice of customer complaints?

In its 1998/99 annual report, the body responsible for registering ISP grievances, the Telecommunications Industry Ombudsman (TIO), said the number of ISP complaints lodged with it rose from 1,662 to 3,864. More than half (55.8%) concerned billing problems, the most common relating to repeat dial charges.

The TIO found people were being charged for calls when they believed the line was engaged. However, the calls were connecting for mere seconds and people received a congested signal, similar in sound to an engaged signal. People with modems set to auto-redial were consequently racking up a large number of local call charges.

The TIO also criticised Telstra, which has long argued that it only needs to provide a phone line capable of supporting voice. "Telstra's reasoning that meeting technical standards for voice call connection is a sound basis for charging for calls which fail to connect to an ISP is somewhat unconvincing, especially where Telstra Big Pond is the ISP," the annual report states.

Don't think that because you hear an 'engaged' signal that your modem has not connected. It's possible that it has briefly connected and you are being charged for that call. Unless you know what you're doing, do not set your modem to auto-redial.

Service & Reliability received the following letter from a reader:

Dear *APC*,

I have had problems with an ISP called eisa in Victoria on three occasions now.

I have referred my complaints to the Telecommunications Industry Ombudsman (TIO) for action because eisa ignores my emails and even goes to the lengths of lying to the TIO about receiving them. I still have the emails on my PC and none were returned due to bad addresses — all addresses have been verified.

eisa has always blamed me for the

line dropouts. It told me it was my fault and the dropouts were due to my installation or faulty telephone lines, even though I told it I had no such problems with OzEmail or Melbourne PC Club.

I receive my phone bill every three months and there are 400 to 600 additional calls on each bill. I had Telstra list all my calls for a four-month period to verify this. These extra call charges are a result of trying to connect to eisa's lines, which are always busy, because you have to pay for engaged calls. Most people do not know that you have to pay for engaged calls from failed connections. I pay $39.95 a month for access and $45 or more for extra phone calls, which makes eisa a very costly ISP.

Connections to dead modems are also frequent. eisa's technical section told me to change my modem string, but this made connections to other ISPs void.

eisa's 56K and 56K V.90 modem numbers are always engaged, but you can sometimes connect to the outdated 33.6K modems that eisa has plenty of.

eisa has been making the excuse now for almost a year that Telstra will not install extra lines. Has this request been made to Telstra?

After my second complaint to the TIO, eisa offered me an extra free month's access for the inconvenience they had caused.

However, they have not been forthcoming with a reply to my third complaint and will not reply to the TIO. I have waited months now for a result. It also appears that they have not yet upgraded their systems.

I would not recommend this ISP to anyone.

Gerry Ward
Carrum Downs, Vic

APC forwarded this letter to eisa — which recently announced it was buying OzEmail following Telstra's failed bid — and received the following response:

Dear APC,

eisa has been awaiting the provision of additional dial-in lines in Melbourne for some time. As required under the Telecommunications Act, eisa does not generate the busy tone and is, therefore, not responsible for charges levied by the telephone carrier for engaged signals. In this situation, where an engaged signal is received, the carrier has been unable to deliver the call to eisa's systems and eisa's systems have, therefore, not accepted a call.

eisa has a sizeable file on the specific matter raised by APC. *Considerable time and effort has been expended in trying to address the matter. eisa is more than happy to reveal any of the contents of the file in relation to the matter to* APC.

Ian Timmis, chief operating officer
eisa

Do you rack up more phone calls to your ISP in a month than what you pay for your Internet access? Have you contacted your ISP about the problem? What was the response? Email me at ry@acp.com.au or write to Service & Reliability, *APC*, PO Box 4088, Sydney NSW 1028. Letters may be edited for length or clarity. We regret that not all letters can be personally answered. For a complete archive of *APC* Service & Reliability columns, see http://apcmag.com/service/.

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Will corporate interests fracture XML and prevent the effective sharing of data? **By David Braue**

The XML challenge

Early predictions about the rapid takeup of XML (Extensible Markup Language) are proving to be correct; major software developers are rushing to add XML to their core enterprise-class products. However, ongoing efforts to nail down its role within specific vertical industries will force businesses to wait a while longer before seeing practical benefits from the technology.

XML expands on the role of HTML (Hypertext Markup Language) by allowing developers to build files with 'meta' information — information about information — that describes the actual meaning of the information contained in the file (see 'XTHML: Cracking the code' on page 84).

This has made XML the darling of the corporate world, where the transfer of business data between incompatible business systems has been a major bugbear for years. However, implementation won't be simple; consolidating business data structures will force companies to develop a common business language to use across their internal divisions. However, the end result will be a cleaner and more consistent data infrastructure that can be easily extended to business partners across the Internet.

XML's ability to unite business partners across an industry has positioned it as a far more accessible version of EDI (Electronic Document Interchange). For a long time, EDI has standardised data transfer in many industries, but its high cost and rigid design parameters have limited its use.

"Within two to three years, all the tools will be in place to let us use XML without even knowing it's there," said Clive Finklestein, managing director of Perth-based Information Engineering Services. "The real problem is that we won't be able to use them because organisations haven't agreed what their metadata is." For example, the terms 'birth date' and 'birthday' could be used to describe the same information.

"Most organisational structures are based on the early growth of manual processes," Finklestein continued. "Then we automated those, and went from manual chaos to automated chaos with redundant data that is still not integrated, because we haven't agreed what the common term should be within enterprises. These homonyms can cause real problems because the words that are used sound familiar, but the context they're used in may be totally unintelligible."

Unifying an entire industry around a common business terminology will be critical for XML to become widely accepted.

This challenge is compounded by the various commercial interests jockeying to position their technology as the central repository for XML data storage and exchange. Microsoft's long-awaited BizTalk initiative, which was initially expected to ship right after Windows 2000, has been delayed until the third quarter — and with it, many companies' XML deployment plans.

Microsoft's delays mean an opportunity for other companies to gain a strong presence in the XML market. IBM recently completed its Business-to-Business Protocol Framework (BPF) that will help developers integrate tpaML (Trading Partner Agreements Markup Language). tpaML is an IBM-developed XML enhancement for the online exchange of business contracts.

Novell has combined its own DirXML standard with NDS eDirectory to create iChain, which combines XML's data exchange capabilities with features such as directory-enabled billing and authentication of employees and business partners.

In much the same way as Microsoft and Netscape used proprietary HTML extensions to distinguish their competing Web browsers, mass confusion could result from the potential fragmentaion of XML by commercial interests. Several analysts have already suggested that businesses should wait at least 12 to 18 months before seriously deploying XML, until differences between competing products are resolved.

Tim Bray, author of the original XML specification in 1996, believes XML's natural evolution will eventually smooth over any potential incompatibilities.

"There's this plethora of industry initiatives and cross-industry initiatives bringing business infrastructure to the table," he said. "I think it's good to be competing to build pieces, but it can be hard to keep up with what's going on. [Fortunately,] it's clearly impossible for anyone to get a lock-in on a customer by using XML, since the data in XML repositories is easy to take elsewhere."



Minimising the potential difficulties of XML adoption is a key goal of groups such as OASIS (the Organization for the Advancement of Structured Information Standards), a consortium that maintains the watershed xml.org site and is driving XML standardisation efforts among its 100-odd members.

One of OASIS' key projects is a joint venture with the United Nations to develop ebXML (electronic business XML), a far-reaching standard that — much like the UN's previous UN/EDIFACT standard for EDI — will provide a consistent XML framework for international exchange of corporate information.

"The problem we're seeing is that as people move from legacy technologies like EDI or they're doing brand-new solutions on the Net, they're just rolling their own [XML]," said OASIS chief strategy officer, Robert Sutor.

"They're very well intentioned because they're trying to move forward, but ebXML is working on this infrastructure and trying to harmonise a lot of the things that have been going on. Industry by industry, you will see groups getting together to define appropriate XML schemata for what they need to describe. This is not an example of proliferation; it's what's been expected."

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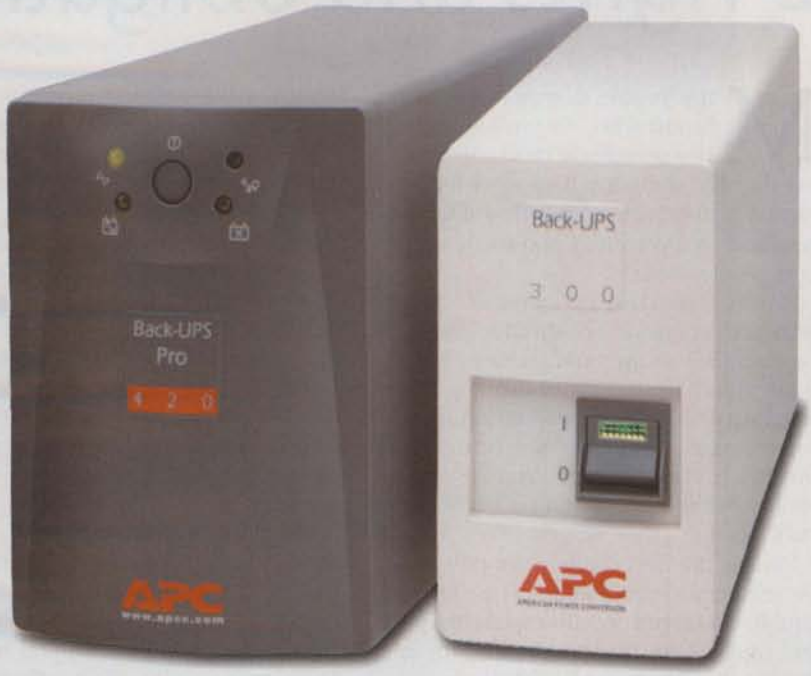
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Is it legal to send spam? Can your employer legally read your email? The answers may surprise you. **By Leif Gamertsfelder**

E-rights and obligations?

Many people express anger and disgust when they receive what they perceive to be spam or find out that the company they work for has viewed their private email. How does the law react to a perceived abuse of e-rights in these situations?

Many marketing people have embraced spam as an effective tool for parting fools from their money. But is spam legal? Some US jurisdictions have introduced legislation prohibiting spam. For instance, California has introduced the Internet Consumer Protection Act which prohibits the sending of unsolicited bulk email.

Under the act, Californian ISPs may publish a notice prohibiting the use of their equipment to send or deliver spam. If a person contravenes this prohibition, an ISP can sue that person for $US50 per message (up to a maximum of $US25,000 for every day the spamming continues), or for the actual loss the ISP suffers as a result of the spamming. The law also allows an ISP to recover lawyers' fees associated with any infringement proceedings.

The law also provides that the unauthorised use of domain names in email is a criminal offence and offenders can be fined up to $US5,000 and/or imprisoned for up to a year.

In addition to statute-based prohibitions of spamming, some courts have decided that spamming is unlawful under principles of Net etiquette. In a recent Canadian case, an account holder's contract with its ISP provided that "the account holder agrees to follow generally accepted 'Netiquette' when sending email messages".

After entering into the contract, the account holder was either directly or indirectly responsible for sending up to 200,000 spam emails a day. The ISP subsequently deactivated the account holder's site for a breach of Netiquette. The account holder then went to court alleging the ISP had actually breached the contract by deactivating its site. The account holder also sought an order compelling the ISP to reactivate its site for the duration of the contract.

In denying the account holder's claims, the court held that the account holder had breached the contract. The court noted that "it appears clear that the sending out of unsolicited bulk email for commercial advertising purposes is contrary to the emerging principles of 'Netiquette'".

Another common issue involving e-rights relates to employers viewing employee email. In a US case, an employee was fired after Nissan Motors discovered that the employee had sent messages to another Nissan employee that were of a personal, sexual nature and not business related. Nissan discovered this when its information systems specialists reviewed tthe entire workforce's email.

Among other things, the employee complained that the retrieval, printing and reading of email messages by Nissan's staff breached certain laws relating to the interception and printing of email messages. The employee also alleged that Nissan's actions breached laws prohibiting the eavesdropping or recording of a "confidential communication by means of any electronic amplifying or recording device".

After reviewing these laws, the court rejected both of these arguments. In general terms, the court held that the interception allegation had to fail because the reading and printing of employee emails from a company server did not constitute the "interception" of a communication for the purposes of the relevant law. The court reasoned that Nissan's actions were necessarily authorised because it owned and controlled the network on which the reading and printing took place.

The court reasoned that the eavesdropping allegation must also fail because the law prohibited only "the interception of communications by the use of equipment which is not connected to any transmission line". In using its own network resources to read and print the emails, Nissan's actions did not fall within the scope of this law.

In many cases, the same result may follow under Australian law if Australian businesses comply with the provisions of the Telecommunications (Interception) Act, which could cover the interception and recording of email.

In these types of cases the Listening Devices legislation will not assist Australian employees because it only applies to the listening or recording of spoken communications between private parties.

Although they may have the right to read an employee's email, employers should be very careful about the way in which they attempt to assert their e-rights. Businesses should make it clear in letters of offer to potential employees and in their human resources manuals that email is not to be used for private purposes. It should also be made clear that the business may monitor, read and store copies of all emails transmitted to or from its network. This information would provide clear guidelines about the use of email and minimise uncertainty about e-rights in the workplace.

Links

Internet Consumer Protection Act
http://seclab.cs.ucdavis.edu/~zerkle/millerbill/

Nissan's case
http://www.law.seattleu.edu/chonm/Cases/bourke.html

Canadian case
http://www.cyberspacelaw.org/loren/netiquette.html

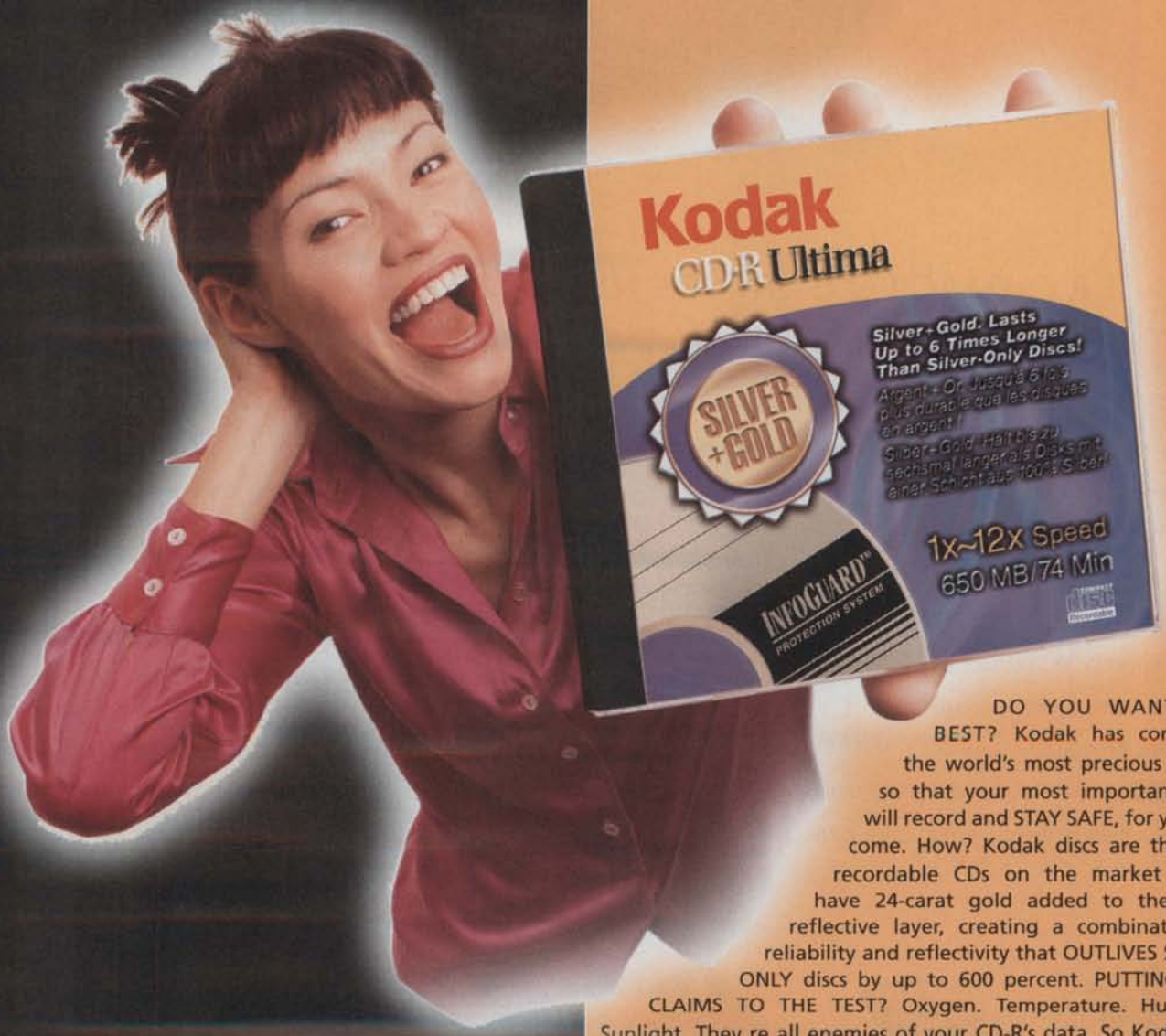
Telecommunications (Interception) Act 1979 (Cth)
http://www.austlii.edu.au/au/legis/cth/consol_act/ta1979350/

For an example of State Listening Devices legislation, visit:
http://www.austlii.edu.au/au/legis/nsw/consol_act/lda1984181/

Leif Gamertsfelder practises at Deacons Graham & James in Brisbane. He can be contacted at leif.gamertsfelder@dgj.com.au. This column is intended to provide general information only and is not a substitute for legal advice. For a complete archive of *APC* Legal Ease columns, see http://apcmag.com/legal/.

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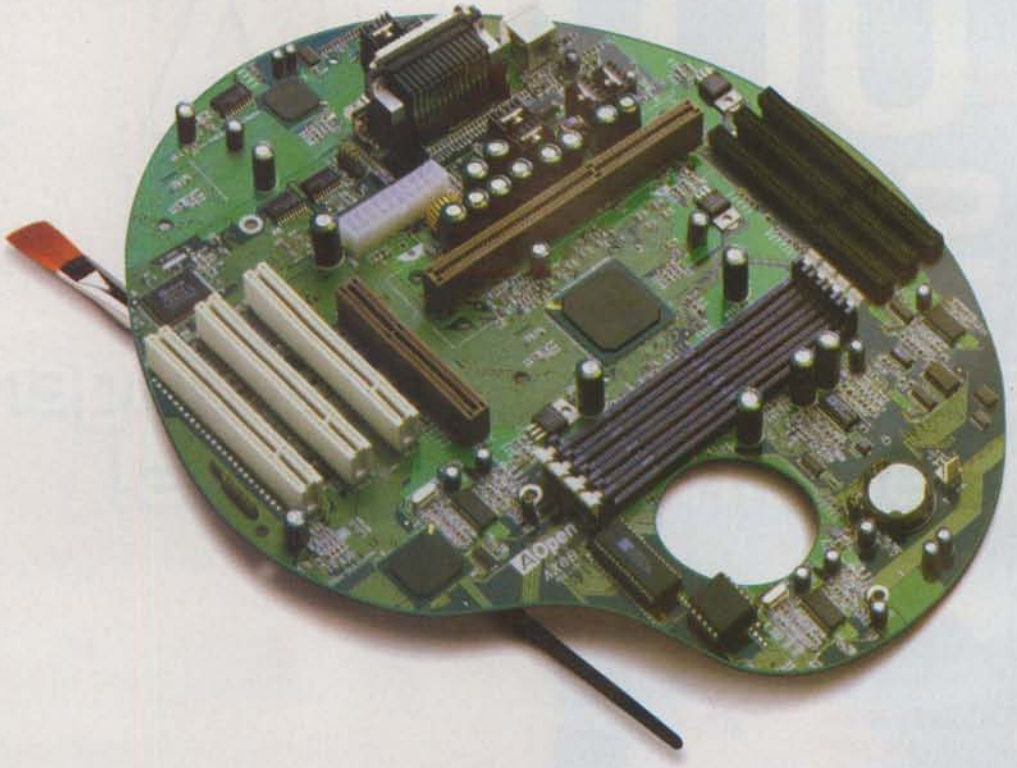
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PC @uthority – Motherboard test feature June '98.

"...it's a dream board for performance enthusiasts."
Editor's Choice – APC mag – BX Motherboard test July '98.

"...AOpen AX6BC is a faster board than the Abit BX6-2...more stable at higher bus speed, especially 133MHz and beyond."
BX Boards.com – 1999.

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Game on



Analysts are forever predicting the death of the PC and its replacement by some newfangled device or other; meanwhile, PC sales cheerfully continue to rise. Manufacturers of new gaming consoles and Web devices are hoping that attention to consumers and easy Net access will equip them for a major assault on PC manufacturers. **Nathan Taylor** and **Angus Kidman** take a look at the new contenders and ask whether supplementing rather than replacing the PC is the answer.

Although cries of 'the PC is dead' seem somewhat exaggerated, there's little doubt that the PC industry is scared. The threat of a mass-market consumer device that would replace the PC as a means of accessing digital services and entertainment has been around at least since the 'network computer' frenzy of 1995, but the threat has never been as pronounced as it is now.

Console manufacturers are building more power and more functions (including DVD playback and Internet access) into their systems, making the PC far less appealing for home entertainment or Net access. Mobile phones and digital assistants can handle email, scheduling and content browsing, and wireless application protocol (WAP) promises to enhance these functions rapidly over the next year. What's left for the PC? Office applications? Perhaps not: application service providers (ASPs) can provide fully featured applications to a low-spec client, and they have the advantage of easy maintenance.

Recent attempts to replace the PC with a powerful server and a low-spec client have just about died an inglorious death (proved by the failure of initiatives such as Oracle's NC and Microsoft's NetPC). Rapidly falling hardware prices eliminated the appeal of using a slimmed-down system, and users have been reluctant to abandon the familiarity of Windows.

The latest revolution is different, though, because it approaches computing from a different angle. Initiatives such as the NC and the NetPC were intended to centralise processing power and management for businesses. The new wave of 'PC replacements' is intended to simplify computers, rather than shut down their functions. It's not even about cost (the experiences of 'free PC' providers have proved that very low prices alone won't shift systems).

Most significantly, where all the talk was once about convergence in the PC — with PC-style devices designed to do everything from broadcasting TV to balancing your books — it's now about divergence, making devices that do just one thing well.

In a report released in February, IDC predicted that the market for consumer Internet access appliances, such as Internet consoles, screen phones, WebTV-style set-top boxes and Web terminals, would outstrip the market for PCs in 2002. IDC believes this marks the start of what has been dubbed the 'post-PC era', and predicts that the information appliances market will exceed $17.8 billion worldwide in 2004, up from $2.4 billion last year. That's a steep growth curve, and several appliances will need to become very popular for it to happen.

The console

Last year's launch of the Sega Dreamcast was one of the most successful in the industry. Sega sold over half a million systems within two weeks of the US launch. In Europe, it sold 100,000 systems within

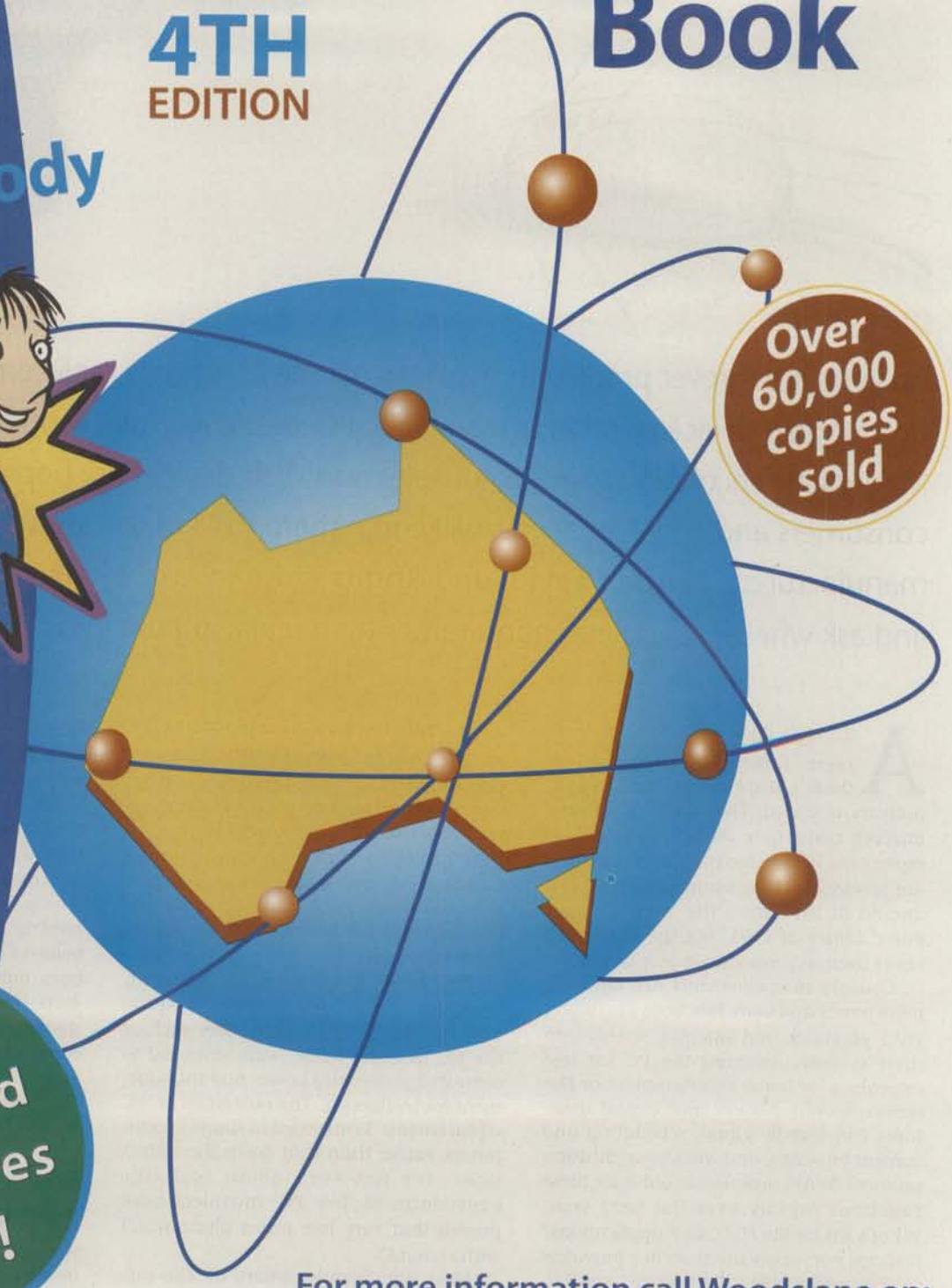
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Sega Dreamcast

Launched late last year, the Dreamcast was meant to be Sega's comeback after the disappointing sales of its Saturn console. And quite a comeback it was. It has sold very well, and is easily the best console currently available in terms of techology. The PlayStation still has many more games and developers, but the Dreamcast is catching up.



It is powered by a 200MHz Hitachi SH-4 processor, a PowerVR graphics chip (a chip also available for PCs) and 24M of RAM. According to Sega, these are capable of combining to create 3D scenes with up to 3 million polygons delivered per second. By comparison, the PlayStation delivers about 360,000 polygons at peak, and the PlayStation2 is expected to have a peak capacity of about 20 million polygons per second.

Although much was made of the fact that it can run a customised version of Windows CE, it actually means little to the end user — all the GUI and applications of Windows CE have been stripped away, leaving only the kernel and the core API set behind. The APIs were developed to be highly compatible with desktop versions of Windows, making porting games from the PC easier.

The media for the console is unusual — the Dreamcast supports a customised type of CD media developed by Yamaha. The media holds 1G per disk, and is designed to prevent software pirates from burning copies of purchased games. The controllers (there are four controller ports) are also unusual and sport detachable Game Boy-like devices that double as memory cards. A range of other controllers is available, including a keyboard.

The latter will be most useful when used in conjunction with Sega's recently launched online service. The console incorporates a 33.6K modem (56K for US consumers), which can be used as an Internet access device and allows people to surf the Web through the console. Internet access disks were recently made available, and now Dreamcast owners can surf the Web through Big Pond.

a day of its launch. It didn't hurt that Sega's timing was perfect: it was well ahead of its competitors' next-generation products and it was the first major console to be released for some time, bringing with it many technical advances. (For more details on the Dreamcast and the other future consoles, see the boxes on this and the following pages.)

For many observers, the interesting thing about the Dreamcast was not its technical specifications; although they were impressive, the PC platform still had more power available. What was interesting was the built-in modem, which allowed connection to the Internet for both Web surfing and online gaming. The Dreamcast is still, first and foremost, a gaming device, but its ability to provide access to the Internet (which has only recently been realised in Australia) left many PC manufacturers more than a little concerned.

Sega is not the only contender in the Net-without-PC camp. After the phenomenal success of the original PlayStation, Sony attracted a lot of attention simply by announcing the features of the PlayStation2 console (which was released in Japan in March). Its powerful processor and advanced IO capabilities will make the PlayStation2 the closest thing to a PC replacement that console manufacturers have produced.

Even Microsoft realises the threat posed by the simplified computing device, and is already developing its own console design, which not surprisingly uses a version of Windows. Microsoft has shied away from discussing its X-Box project, but it has registered the xbox.com domain. However, reports suggest it will contain a 500MHz to 1GHz-plus processor, a 3D graphics chip, a 4G hard drive, a DVD-ROM and 64M of memory, and use a variant of Windows that is capable of running existing Windows games.

If those specifications are accurate, then the X-Box is starting to look suspiciously PC-like. The only real differences are the fixed specification and the operating

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Sony PlayStation2

About the time of Sega's Dreamcast launch last year, Sony launched into a major vapourware campaign, giving details of the spectacular specifications of its new system, which was due to be launched in Japan late last year. The Japan launch was set back to March 4 this year. The product won't be seen in Australia until some time after that. Officially, it's due to be launched at the end of this year, but given the delays in Japan, it probably won't appear here until the first quarter of 2001 — about a year and a half after the launch of the Dreamcast.

The specifications for the system are certainly impressive (if not actually PC-beating). It will be driven by a custom-built processor called the Emotion Engine. Running at just under 300MHz, the Emotion Engine will be accompanied by a graphics chip called the PlayStation2 Graphics Synthesizer, which runs at 150MHz. The device will have 32M of RDRAM in addition to 4M embedded cache for graphics and 2M for sound. According to Sony, it will be able to process about 20 million polygons per second and support 48-channel sound.



It will use DVDs, possibly with some proprietary copy protection. The DVD drive will run at 4x and play CDs at 24x. Unlike Nintendo's Dolphin, the PlayStation2 will be able to play DVD movies. The DVD playback will be fully capable, including multiple camera angles and audio tracks. The software to play back DVDs will be on a memory card supplied with the PlayStation2. Control will be through the game pad or a remote control, which will probably be sold separately.

The advantage of backward compatibility has not escaped Sony. One of the device's more appealing features is support for existing PlayStation titles. This is enabled by the use of the existing PlayStation's processor as an I/O controller (it will also have an extra 2M of memory in the I/O controller for use in legacy titles). It has already been revealed that some PlayStation titles will not work on the PlayStation2 — Sony has a growing list of incompatible titles on its Web site. Existing PlayStation controllers will also be usable on the PlayStation2. Old memory cards will not be supported though; Sony plans to introduce a new 8M memory card.

system Microsoft is developing for the platform (although if it does have a hard drive, that will differentiate it from current consoles and provide a wider set of abilities).

It's unlikely that Microsoft will manufacture the product, should it ever hit the market. Microsoft has tended to favour using reference designs for OEMs, while backing them up with operating system support for supplied features. Its previous lack of success in such endeavours (most notably the 'PC 9x' initiatives, put together with Intel, and to a lesser extent Windows CE), may mean that an actual X-Box may never be produced.

Console economics

The appeal of consoles is not processing power; modern PCs are much faster than any existing consoles. Even the much-vaunted power of the PlayStation2 will not be able to match the power of PCs available at the time of its launch. Indeed, the already available GeForce graphics chip's rated geometry transformation ability isn't far behind that listed in the PlayStation2 specifications. By the time the PlayStation2 arrives, nVidia should have released its NV15 and NV20 products, which are expected at least to equal the PlayStation2's specifications.

The major selling points for consoles — and indeed all products in the emerging 'information appliance' category — are simplicity and cost. The limited functions and fixed specification of consoles makes them far more accessible to non-technically minded consumers. All you need to do to use today's consoles is plug in a cartridge or put in a CD and turn the system on. IDC anticipates that a growing number of consumers will want Internet access without the inherent complexities of PCs.

The fact that consoles cost a fraction of the price of a PC is another selling point. Even with the decline in PC prices over the last year, a modern PC is still likely to cost at least five times more than a console. Currently, the most expensive console, the Dreamcast, sells for about $500 at the Games Wizard chain of shops. PlayStations can be bought at the same chain for $200. By comparison, a mid-range PC from Gateway (500MHz Pentium III, 10G hard disk, 64M of RAM) sells for about $2,200. If all you want to do is play games and surf the Web, the choice seems clear.

The economics of the console world of the future, however, will be complicated. Consoles operate now as loss leaders. Manufacturers sell them cheaply (often at a loss), but make money on the games. All console manufacturers collect

Console and PC 3D performance comparison*

Consoles	Approximate peak rated polygons per second
PlayStation	360,000
Sega Dreamcast	3 million
PlayStation2	16 to 66 million (depending on features used; average expected to be about 20 million)
Nintendo Dolphin	Unknown, but Nintendo claims it will be faster than the PlayStation2
PCs	
nVidia GeForce (using hardware geometry engine)	10 million
Pentium III 600 (approximate, depending on other requirements)	3 million

* These comparisons should not be interpreted as definitive. Polygons are not the only measure of performance, and can be deceptive. Other features can affect performance and visual quality.

The performance and capabilities of the PlayStation2 are only part of the story. The new console will sport a large variety of input and output media, allowing all sorts of devices to connect to it. In addition to a digital optical output, the PlayStation2 will have two gamepad ports, two USB ports and an IEEE 1394 (called I.Link by Sony, FireWire by Apple) connector. There will also be a type III PC Card slot. With these devices, the PlayStation2 has the potential to utilise common PC devices, including input devices, printers and scanners, and memory and networking devices — all that is needed are drivers and software. Unlike the Dreamcast, it does not have any modem or networking device built in, but one can be attached later via the external ports. USB networking devices already exist.



For Internet access, Sony plans to develop relationships with local broadband providers to develop online services, but these probably won't be available at the time of release.

Sony has stated that it expects to sell at least 1 million PlayStation2s at launch — a figure which several research organisations consider to be a conservative estimate. In Japan, the cost of the PlayStation2 will be ¥39,800 at launch (about $600), although the usual method is to launch at a very high price to get the most from enthusiasts who just can't wait, then lower the price in order to tempt price-conscious consumers.

royalties on commercial games released for their platforms. This advantage changes when the primary use of the console becomes Web surfing or DVD playback, because this content isn't controlled by the console developer.

There is potential for profit through a partnership with a network provider (such as Telstra's deal with Sega for the Dreamcast in Australia). But console companies are pursuing portals. Most Net appliances will have a hard-wired home page which will be displayed every time you log on, and will be used to gain access to customised content and special features. Those pages will attract huge audiences (if only by default), allowing the company to charge heavily for advertisers on those sites. Console companies are also expected to make aggressive deals with the third parties that provide content for those portals. Sega, for instance, is seeking a revenue cut from sites which provide content for the comma.com.au portal it has set up for local Dreamcast users.

This 'lockdown' approach has been successful for many other companies online (AOL's users always enter through the main AOL page, and much of the traffic to the Netscape and Microsoft sites is a result of browser defaults that are never switched off). However, whether it proves economically viable in the console world is still an open question.

The Net appliance

Consoles are far from the only Net access device for the non-PC fanatic. Amid the usual Microsoft spruiking, Bill Gates' keynote speech at Comdex Vegas last year dwelt on what is considered to be a new class of device: the Internet appliance. For once, Gates was in tune with the mood of the times; the show floor was littered with new attempts at producing simple Web access devices.

Although it draws on some concepts from earlier systems such as teletext, the Net appliance's origins can be traced back to 1995, when WebTV released its eponymous debut product. The revolution in Web devices was crude and slow in starting, but it is picking up momentum as more developers release products that are less proprietary than the originals.

Although it's not available in Australia, WebTV remains the archetype for non-PC consumer Internet access devices (there are similar products available in Australia, such as Civic Video's Web TV).

In the US, a WebTV box sells for as little as $US99, although there are more expensive devices that can perform extra functions, such as controlling a VCR. A typical WebTV set-top box provides Web browsing, email and television program information. It can connect to certain printers

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Nintendo's Dolphin

In contrast to Sony's carefully timed sequence of press releases designed to maintain interest in its upcoming platform, Nintendo has been somewhat reticent about its next console, codenamed Dolphin. The details it has released have been sketchy at best.

Early reports indicate that the Dolphin will use a modified version of the PowerPC processor, running at 400MHz. IBM will manufacture the processor, codenamed Gekko, on a 0.18-micron copper process. This main processor will be accompanied by a graphics processor developed by US company ArtX, which will run at 200MHz. It's not official, but the processor is reputedly capable of over 30 million polygons a second, as well as S3 texture compression.

Nintendo will be abandoning its cartridge format in favour of a customised DVD player with special counterfeit protection incorporated into it.



The Gekko processor, to be used in the Nintendo Dolphin

Although it hasn't revealed what form this protection will take, Nintendo has already stated that the device will not initially be capable of playing DVD movies. In Japan, Nintendo does have plans to release a more expensive DVD/Dolphin device capable of playing movies, but has not yet decided whether that product will be available internationally.

Little else is known for sure about the Dolphin — it isn't even known how much memory will be used in the system. It's almost certain to have some kind of networking support, although whether that will be in the form of a broadband device or a modem has not yet been determined.

Nintendo plans to release the device in Japan by the end of this year, although it is possible that it could slip into 2001. If previous releases are anything to go by, the product won't be seen in Australia until the end of 2001 at the earliest.

for making hard copies of pages or email.

WebTV in the US can also connect to just about any ISP, although a regular stipend still has to be paid to WebTV Networks. The boxes are manufactured by several different parties: WebTV Networks (now owned by Microsoft) doesn't lock the user into a Web access plan or a specific piece of hardware. Instead, it locks them into a content plan. The first thing you go to when you use the product is the WebTV home page, which has services that are specifically catered to WebTV users.

WebTV is not the only player out there, and a recent move to offer free subscriptions to some users suggests that it may be running out of steam. AOL recently signed a deal with Gateway to develop set-top boxes of its own, so that people without PCs can access the AOL network, and AOL TV is expected to roll out in the US midyear. Internet phones, such as Cidco's iPhone (see *APC* October 1999, page 42) are springing up everywhere. Simple devices with embedded flat screens, such as Qubit's wireless Web Tablets, are starting to appear in the US. Even Intel, a bastion of the PC world, is throwing its hat into the ring, and has started developing low-cost Net access devices based on Linux.

Then there's the ubiquitous mobile phone. The development of WAP applications (see *APC* March 2000, page 72) means that mobile phone users will be able to enjoy a large variety of Net services through their phones. These are likely to be highly specific and provide information that needs updating regularly, such as stock market prices.

One interesting question concerns the basic technologies that information appliances will run on. A number of devices will undoubtedly use Microsoft's cut-down Windows CE (unsurprisingly, all the devices shown at Comdex by Gates did just that). However, Windows' reputation for instability means that it will have a tough time getting into the appliance market. Linux is the current darling of Web device developers because it is free. Be, after failing to capture market share, is also focusing on developing and marketing an operating system for the limited device. QNX already has a thin client Net operating system and is also actively courting hardware developers.

Time for a replacement?

All these initiatives suggest that devices that aren't currently thought of as part of the technology revolution will play an increasing role. However, it cannot be assumed that the emergence of new ways to access the Net, play games or even use basic productivity applications will automatically mean the death of the PC (or the 'Post-PC era', as IDC would have it).

Rival predictions suggest that the PC will continue to grow. US research company eTForecasts predicts that PC sales will continue to increase for at least the next five years. One factor driving this increase will be the emergence of information appliances. "Information appliances will take some sales away from PCs, but they will also generate new opportunities for the PC industry," eTForecasts researchers noted in a February report. "Millions of PC servers will be needed to support the hundreds of millions of information and Web appliances that will be used in homes, offices and mobile locations."

It's also worth noting that the rest of the world isn't experiencing flattened growth in PC sales like the US, where most of the 'PC is dead' rhetoric is coming from. For instance, 19 million PCs were sold in the US in 1995, 36 million in 1999 and a projected 64 million in 2005, according to eTForecasts data. Figures for the Asia-Pacific region for the same years are 12 million, 24 million and 56 million respectively.

More importantly, recent history suggests that the arrival of an alternative technology doesn't always kill off rivals. Mobile telephones are being used by record numbers of Australians, but very few people have totally abandoned landline phones as a result. Owning a PalmPilot is much easier if you can link it to a PC for data entry. Many people have a computer in the study and a PlayStation in the lounge room. Specialist devices (such as consoles) can co-exist happily with general purpose devices (such as televisions).

A recent survey of US consumers by Dataquest found that 2.1 million people had used their PCs to watch television. That might seem to give support to the 'PC as convergent device' theory, but that number was dwarfed by the 27 million people who chose to surf the Web and watch television at the same time. These findings suggest that neither technology is likely to eliminate the other; the benefits of each can be enjoyed. Rather than entering the 'post-PC' era, these trends suggest a different model, where the PC remains as a general all-purpose tool, and specialised devices will work alongside it (and, in some cases, connect to it). Why throw out your PC when you can enhance it?■

Plumbing the depths

An interview with Bob Metcalfe

Internet pioneer Bob Metcalfe believes that monopolies can benefit technology research and that telephone companies are choking the Net's progress. Is this a contradiction? "It's better to be wrong than to be vague," he tells **Josh Mehlman.**

When Bob Metcalfe talks about the Internet, it's worth listening. For the last 30 years, Metcalfe has been involved in connecting computers together as an engineer, mathematician, computer scientist, entrepreneur and analyst. From the early days of the Advanced Research Projects Agency Network (ARPANet) to the invention and commercial success of Ethernet, Metcalfe has been a networking pioneer, yet he still modestly refers to himself as a 'plumber'. Along the way he even contributed one of the laws of computing: Metcalfe's Law, which states that the value of a network increases exponentially with the number of computers connected to it.

Metcalfe studied electrical engineering and business management at MIT (Massachusetts Institute of Technology) in 1969. He received a masters degree in applied mathematics in 1970 and a PhD in computer science in 1973 from Harvard University. While finishing his PhD, Metcalfe started working at the Xerox Palo Alto Research Centre (PARC), where he and researcher David Boggs invented the Ethernet protocol for networking in 1973. In 1979, Metcalfe founded 3Com to commercially develop Ethernet. Metcalfe remained at 3Com until 1990, and since then he has been a technology pundit and consultant for publishing firm IDG and its research arm IDC.

Ethernet was one of many inventions that came out of Xerox PARC, which was also responsible for the development of the desktop PC, the laser printer, the graphical user interface and the mouse. What was so special about Xerox PARC? "Xerox had a monopoly position on photocopiers, so it had profits to invest in various ways and decided it would invest them generously in long-term research in office automation," said Metcalfe. "When I joined Xerox research in 1972, I was in the science lab and there the ethic was you did research for its own purpose and it was somehow low to be working on something with practical application. I remember declaring in some meeting that contrary to this belief it was my intention to do something that Xerox would sell a million of."

Metcalfe believes this 'research for its own sake' model is undergoing a transition. "The research community is in a tizzy at the moment because the amount of government commitment to research is dwindling," he said. The only businesses that



fund long-term research are those that have monopoly profits to invest, "but monopolies are in retreat now, the sentiment is against them and that does not bode well for the funding of corporate research, which means new structures need to be formed. My current view is that research universities are where research will be done, with companies and governments supporting in some new combination."

Ethernet was, to borrow a phrase from Sun chief scientist Bill Joy, coming up with the solution before people knew they had the problem. "Ethernet was invented in 1973 to solve a problem that did not exist before," said Metcalfe. "There weren't personal computers at every desk. I happened to be in the room when someone said 'We're soon going to have a computer on every desk. How are we going to network them?'" Ethernet was initially designed to connect Xerox's Alto desktop PCs to the ARPANet and to the world's first laser printer.

From invention to commercial success took 10 years. "Ethernet was invented on May 22, 1973. I don't think it took off commercially until 1983," said Metcalfe. In 1979, Metcalfe formed his own company, 3Com (the name is derived from 'computers, communication and compatibility') to sell Ethernet technology. 3Com went public in 1984 as a result of the wide deployment of Ethernet systems. In the 10 years between invention and commercial success, "there was the technology that needed to be invented and perfected, then there was a standard that needed to be developed and then there were the products that interoperably implemented that standard".

Although there were many competing networking standards, Ethernet became the dominant one. Its closest rival was Token Ring, a solution invented and implemented by IBM, which at the time was by far the dominant force in computing. Although he believes Ethernet had a "modest technological superiority" over Token Ring, Metcalfe believes it wasn't technological reasons but the idea of an open industry standard that killed Token Ring. "From 1979, Ethernet was positioned and driven as an open industry standard around which competition would develop. Because of IBM's monopoly position in the mid-1980s, Token Ring from inception was positioned as an IBM-only solution. Even when they later got the idea that it should become an industry standard, their heart was never in it."

Moving on

Metcalfe remained with 3Com until 1990, when he was passed over for chief executive officer for the second time. He is philosophical about leaving 3Com. "I left because the company outgrew me. My

skills and interests relate more to rapid change and chaos. When things start to get well organised and humming along, my skills do not rise to the fore," he said.

Since 1990, Metcalfe has written a regular column in *InfoWorld*, become a technology analyst and pundit, and given over 500 speeches worldwide. "A pundit is a kind of journalist who is supposed to have opinions as opposed to a journalist who is not supposed to have opinions," he said. "It allowed me to stay in the industry I've grown up in but to have a completely different role."

In his column, 'From the Ether', Metcalfe has predicted, among other things, a collapse of the Internet in 1996 and a crash of Internet stocks on November 8, 1999 — neither of which eventuated. However, Metcalfe is unapologetic about these predictions. "It's my job to make mistakes. I've learned one of the success factors in punditry is that it's much better to be wrong than to be vague," he said emphatically.

Internet: The next generation(s)

Building on his plumbing experience, Metcalfe now spends a lot of time contemplating the future of the Internet. "There is no one next-generation Internet," he said. "The beauty of the Internet is that it's been divided into layers so that progress may proceed at its own rate in any of those layers."

Metcalfe says the current Internet addressing system is running into problems. "A lot of the Internet infrastructure assumed people would be accessing the Internet while sitting at their desks. The number of people moving around is going to seriously stress, if not break, the current addressing system," he said. He believes this problem is being addressed by IPv6 as well as mobile data initiatives such as WAP.

"ICANN [Internet Corporation for Assigned Names and Numbers] is currently going through the agony of the damned trying to resolve domain name issues," he said. "While this fight is going on about how and who to allocate these very scarce domain names — there are hardly any interesting ones left — I think people will become less concerned with domain names. It was a trivial piece of plumbing and it will be replaced by more content-based addressing. The solution is more redirecting people's search and finding efforts to a content level rather than a plumbing level. This is bad news for the people that recently bought their URL for $100,000," he said, smiling.

Metcalfe is a strong proponent of optical fibre, and believes every home Internet connection will eventually be of this type. As far as he's concerned, this can't happen soon enough. "There's a law like Moore's Law; it seems the Internet backbone is doubling in capacity every 12 months, which is good except that traffic on the Internet is doubling every four months," he said.

The economics of the Internet are also undergoing a period of great change, he claims. "The Internet started out in an economics-free zone in the research world. Now that it has become big time in commerce, it has had to develop what I call economic infrastructure — the ability for people to pay for things," he said. "And, no, I don't think advertising is going to pay for everything in the future — that's just the current rage."

The current trend towards outsourcing over the Internet is just the beginning, according to Metcalfe. He sees a strong trend towards what he calls 'utility computing', where PCs become conduits to all sorts of information and services over a network, rather than storing the information. This development is assisted by the 'semantic Web' being developed by Tim Berners-Lee, the original author of HTML. "The aim of the semantic Web is to develop a way for computer programs to talk to each other over the Internet," said Metcalfe.

> "We have to get those monopolies out of the way so we can deploy always-on, high-speed connections and get rid of dumb old telephone modems."

The current killer app for the Internet is ecommerce, which is also currently undergoing transition from ecommerce 1.0 to ecommerce 2.0, in Metcalfe's terminology. "This transition is reminiscent of 1981, when the IBM PC came out and we went from PC 1.0 to PC 2.0," he said.

"Companies like Yahoo, eBay and Amazon.com are claiming a first-mover advantage on the Internet. I think speed of movement is more important than who came first," he said. "The first movers are now busy backfilling; for example, Amazon.com is now building warehouses. A second mover like Barnes and Noble already has warehouses." First movers also claim their brands are very powerful, but "nobody outside the Internet has ever heard of Yahoo, or they think it's a chocolate drink. PC 1.0 was Apple, which had a strong brand, but PC 2.0 was IBM, a well-known and established pre-existing company."

Although the future of the Internet has a strong wireless component, Metcalfe does not believe it will ever be the dominant part. "I'm not so much negative on wireless as I am positive on optical fibre. To me the all-optical Internet is where we're going, but of course there will be wireless devices," he said. This opinion harks back to the invention of Ethernet. Ethernet's packet-switching techniques were based on Aloha, a wireless network. "We chose not to make Ethernet wireless because coaxial cable was better than radio by orders of magnitude in cost and speed. It's clearly going to continue to be true."

Playing monopoly

Metcalfe is ambivalent on the topic of monopolies. "The only companies that can afford to do long-term research are monopolies. Bell Labs from the telephone company [AT&T], Xerox from the photocopier and now Microsoft is ramping up its research labs, and how can it do that? Well, it has monopoly profits to invest."

On the other hand, Metcalfe thinks one of the main reasons progress slows down is because monopolies find it in their interest to slow it down. He says telco monopolies are hampering the development of the Internet. "The Internet has come smack into the intransigent and incompetent telephone companies who are sitting there between business and homes and the Internet backbone. We've got megabits and gigabits in our LANs and megabits and gigabits in the Internet backbone and kilobits in our access to the Internet," he said. "We have to get those monopolies out of the way so we can deploy always-on, high-speed connections and get rid of dumb old telephone modems."

While Microsoft is also a monopoly, he believes that "Microsoft is still vibrant and dangerous rather than old and plodding and standing in the way.

"In the hierarchy of monopolies that deserve slamming, the telephone monopolies are way up there."

However, Microsoft is not entirely without guilt in holding back progress, he believes. "Microsoft would like to stick us with using Windows on PCs and is hampering the development of Internet access through non-PC devices." ■

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Browsing the future

You thought the browser wars were over? Think again. The rise of XML means that compliance with standards is now crucial. As the long-awaited Mozilla from Netscape/AOL gears up for public release, Microsoft may well find itself fighting a different kind of war to the familiar bipartisan battle of attrition. **Andrew Colley** investigates what the latest release browsers offer and what the big two have in store.

The US Department of Justice's antitrust case against Microsoft was a salient point in the browser war. When the software titan included Internet Explorer in the operating system and required OEMs to install it, this was perceived as an underhanded way of pushing Netscape off the Windows platform. The court findings to date have concurred with this view. In spite of US District Court Judge Thomas Jackson's findings of fact, it was already over for Netscape. The IT press had long recognised that in terms of market share, Internet Explorer was the victor in the browser war.

The final court decision hadn't been brought down when *APC* went to press, but to recover the enormous amount of ground required to regain control of the PC browser market, Jackson would have to outline an extraordinary set of remedies in Netscape's favour. However, as the Web enters the XML age, its infrastructure will receive a major overhaul, with the potential to restart the browser wars in an entirely new form.

The browser wars are no longer simply a matter of feature comparison. Questions of cross-platform support and object mechanisms are becoming more important, but most critically, standards support has become much more clear-cut. Previously, both companies' implementations of standards were far from pure, but now — at least in theory — it's compliance or nothing.

The standards issue, together with the expansion of the browser market to portable devices, will have a marked effect on browser design and the way browsers will be used in the future.

XML: The new battleground

To fully grasp the importance of XML, you need to understand the technical history of the Web. Two pieces of technology have been crucial to the success of the Web: Hypertext Transfer Protocol (HTTP) and Hypertext Markup Language (HTML). HTTP is the network protocol that Web browsers use to retrieve machine-intelligible text files from a Web server. Those files contain HTML tags which instruct the browser on how to present and lay out data content (text, images, Java applets, multimedia). The Web's peak standards body, the World Wide Web Consortium (W3C) generates browser compli-



ance specifications which are designed to be used for the creation of browsers that will render sites consistently.

The first Web clients were text-mode line browsers that hyperlinked documents. NCSA Mosaic was the first GUI application that could lay out text and display images within the same document window. Mosaic represented a turning point in browser history, humanising the Internet and ensuring that the Web would become its popular face. It served as a basis for all the GUI browsers that succeeded it, including Microsoft's and Netscape's.

Since the creation of Mosaic, browser development has proceeded rapidly. Modern browsers are capable of presenting aurally and visually rich forms of data content. Much of this has been achieved through plug-in technologies such as RealNetworks' RealPlayer and Macromedia's Shockwave. The popularity of these proprietary technologies indicates that there is broad demand for a universal method of presenting dynamic Web content to give Web authors greater control over the behaviour, appearance and presentation of page elements than that provided by HTML alone.

The concept of dynamic content is not new; it predates the Web itself, but it was revived by Sun's promotion of Java, its platform-independent API. Many believed that Java would ultimately develop the ability to transform any PC on a network (including the Internet) into something more like a thin client, but its biggest selling point was its cross-platform support ('write once, run anywhere'). It made the coding community's dream of writing rich content that could execute in a range of environments a possibility. However, Java has never reached its potential for many reasons, including poor implementations of Java virtual machines and Sun's tight control over the standard.

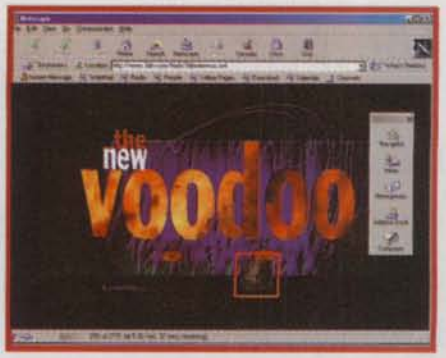
Java now competes with alternative methods for supporting rich content, including DHTML and Macromedia's Shockwave Flash. Whereas Flash is a plug-in application, DHTML is an extension of HTML that utilises scripting languages such as JavaScript and VBScript. In an attempt to standardise DHTML, and to promote consistency in the way browsers render Web pages, the W3C introduced the Document Object Model (DOM) specification. The DOM outlines the capabilities and constraints within which page elements can be manipulated by DHTML and other technologies.

However, DHTML has not been broadly adopted because Netscape and Microsoft implement it in different and incompatible ways. If content developers use DHTML, they need to do extra work to make their sites compatible with both browsers, or exclude DHTML features from users of one of the two major browsers. In the race to add new features to their browsers, Microsoft and Netscape could not wait for the W3C to finalise DHTML standards. As a result, the W3C was marginalised and DHTML failed to gain widespread acceptance.

The Web's inventor, Tim Berners-Lee, chose not to exercise proprietary control over Web standards, knowing that the fledgling Web could never become a global medium if it had proprietary constraints. On one hand, the open development model allowed the rapid development of Web technologies and the prosperity of thousands of Internet companies. On the other hand, it created the environment that allowed the browser wars.

The Web community has pinned its hopes on XML as a means of overcoming many of HTML's limitations and the problems facing Web innovation, by shifting the balance of power away from browser companies and towards content developers.

When the W3C generates compliance specifications for a language like HTML, it provides a fixed set of tags and defines exactly how they are used. XML is a metalanguage in the sense that content providers can create their own custom tags.



Netscape Navigator 4.7: Voodoo browsing

Users assign attributes to those tags in a Document Type Definition (DTD) file that can be applied across a number of documents (or an entire site), separating content from layout. While the XML tags define the structure of data, its appearance is defined separately, using technologies such as cascading style sheets (CSS), a feature introduced with DHTML to provide more precise formatting control, to map content types to layout.

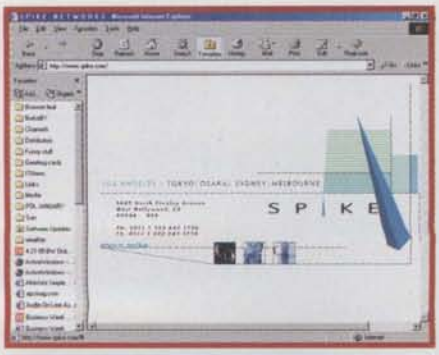
Using custom tags also allows the creation of tags that provide more detailed and meaningful information about the kind of data they contain. This also extends the potential of databases and search engines. The W3C has also developed XHTML, an implementation of HTML which is XML compliant (see 'XHTML: Cracking the code', page 84).

XML's advantage over DHTML is that the standard is now extensible by design and the task of extension has been placed directly in the hands of content developers. Browser companies have traditionally determined how content can be formatted, and content developers and Web users have had to comply; XML reverses the positions of power.

Even with a single standard to work with, both companies have chosen radically different approaches. Microsoft has chosen its familiar 'integrate everything' approach, exploiting its success in platforms and applications to present a single XML strategy that centres on Windows. Netscape has gone down the open source path, opening up its browser code to the world's developers while aiming at multiple platforms. To assess those strategies, *APC* examines the latest browser releases from Microsoft and Netscape.

Microsoft's plan

Like any large building, Microsoft wants to put Windows everywhere. Its strategy is centred on the Web as a desktop metaphor, but this doesn't necessarily translate into many new features for the average user.



IE5: How compliant is it?

It seems that the Internet clock at Redmond has finally slowed a little, at least when it comes to the Internet Explorer 5 series of browsers. There have been few changes to IE5's core features since its release in 1998; most of the changes have been improvements to its back-end capabilities. The latest update, 5.01, is little more than a package of fixes, minor enhancements and security tweaks (the latter addressing problems with IE logging the contents of the Windows clipboard cache). Its key failing appears to be some problems with the Active Desktop.

This lack of major new features is not a new approach for IE. When IE5.0 was first released, there were plenty of minor enhancements such as auto-completing text and improved search management, but the basic interface remained much the same as that of IE4.0. Early betas of IE5.5 suggest that it won't break much new ground either (see the review in *APC* February 2000, page 38).

Microsoft reclassified the IE series of browsers as a software platform component during the Department of Justice's (DOJ) antitrust investigation. This was to support its claim that IE is an integral part of the operating system rather than a separate product. IE5.0 offers the strongest level of system integration of any browser. You can view your desktop and system contents in the main browser pane and have full drag-and-drop capabilities. Furthermore, Windows Explorer now has an address bar that blurs the boundaries between Internet Explorer and Windows Explorer. The desktop can now also be viewed and navigated in the same way as the Web, merging the desktop with the Internet. Microsoft has already incorporated XML into its Office suite, as the first step towards making Office documents compatible with Web documents.

Microsoft's approach to the browser market has changed little in the past few years. DOJ notwithstanding, the strategy is to cram as many Internet elements into the Windows platform as possible and then use a component-based approach to strengthen integration between platforms and existing applications such as the Microsoft Office suite.

With the emergence of XML, Microsoft began to support the use of XML as a standard for integrating documents and applications. According to Microsoft, IE5.0 supports XML 1.0 and CSS 2.0, and incorporates a version of DHTML that closely complies with the W3C DOM. However, when *APC* tried IE5.01 on a CSS test page created by the W3C, some elements failed to render properly.

Other XML-related features are being added to IE. The beta release of IE5.5 includes support for SMIL (Synchronized Multimedia Integration Language), an XML-compliant language devoted to handling multimedia content. It allows developers to incorporate synchronised audio and video to their Web content.

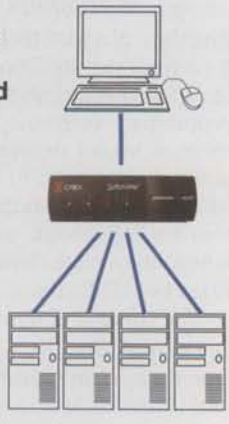
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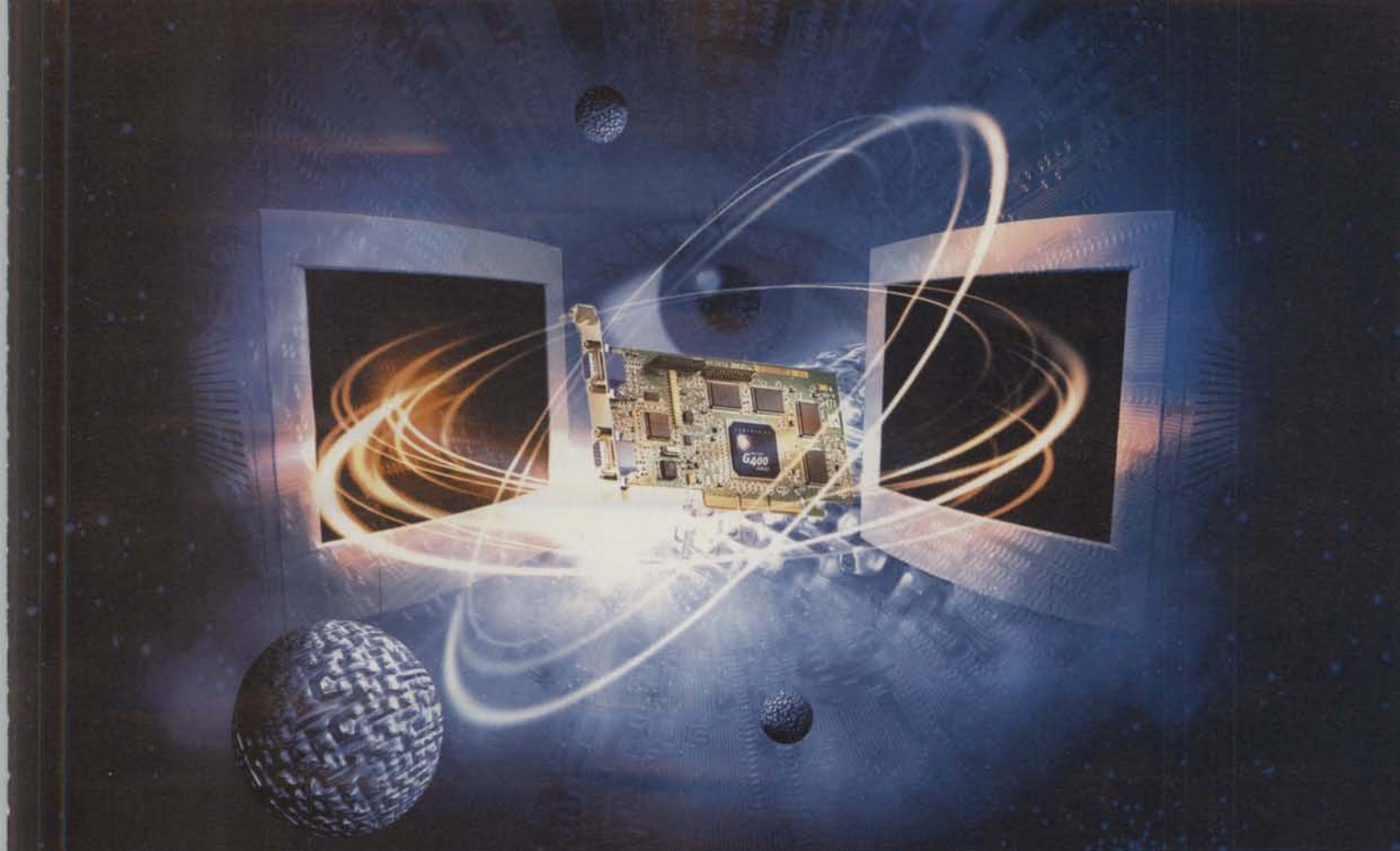


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Netscape's plan

Mocked for its move to open source, Netscape's Mozilla gamble could pay off handsomely if XML becomes the Web's lingua franca and Web devices promote the notion of a cross-platform environment.



Mozilla M13: It's flash and it crashes

Netscape Navigator 4.7 appears to have more new features than IE5.0, but most of them are of the 'bells and whistles' variety. Netscape Communicator 4.7 incorporates a version of Winamp 2.5 and Netscape Radio. The latter is imitated by Microsoft in IE5.

Netscape has superior cross-platform deployment to IE. IE's two platforms (Windows and Macintosh) don't bear comparison to Communicator's 12. However, this comes at a cost to the browser family as a whole. To achieve such a broad cross-platform presence, Netscape has spread its development resources thinly, rather than concentrating them in one platform. As a result, Netscape's browsers tend to suffer more stability problems, and Communicator 4.7 is no exception, but at least when Communicator crashes, it usually doesn't bring down the whole system, as IE does.

Netscape has a complex relationship with W3C standards. Although Netscape 4.7 was promoted as complying closely with W3C standards, the reality is that IE5 complies with the W3C standards more closely than Communicator, especially with respect to the DOM.

Netscape Navigator supports CSS 1.0 and DHTML, but there's no support for XML. Navigator's lack of support for CSS 2.0 and XML deficiencies in Navigator's compliance scorecard give IE5.0 an edge in the eyes of developers, and Microsoft is continuing to improve its XML compliance.

Netscape has only added two extra builds to the Communicator series of browsers since 4.7's release, and it's unlikely there will be any more. The most recent release of Communicator, version 4.72, doesn't boast many significant improvements, and the calendar feature has actually been trimmed from the package. Netscape recently announced that Navigator users outside the US can now strengthen its security encryption capability from 56 to128 bits, but besides this, any improvements to Communicator are likely to be fairly minor. This is because Netscape has focused development on two projects: the Mozilla open source project and Seamonkey.

In March 1998, Netscape released a free, open source version of Communicator 5.0 and distributed its source code to the public as part of its open source development strategy, effectively issuing a global invitation to help develop the browser. Netscape initiated the Mozilla project to coordinate the efforts of voluntary developers. Netscape set up a second project, codenamed Seamonkey, to release a branded version of Communicator 5.0 constructed from the Mozilla source code.

In statements released on the Mozilla Web site, the project's coordinators concede that Mozilla is running behind schedule. Netscape failed to release a branded version of Communicator 5.0 by its deadline of late last year (for a review of Mozilla at the Milestone 10 release, see *APC* January 2000, page 34). Strangely, AOL has suggested it will release Communicator 6.0 near the end of the first quarter of 2001, even though it is yet to release Communicator 5.0.

Of all the components under development, the Gecko HTML rendering engine is under the most scrutiny. If the Mozilla project can achieve its goals, Communicator 5.0 will be able to state that its browser component is 100% compliant with W3C standards, and any browser that uses the Gecko module will also be totally compliant. At the moment Gecko will fit on a single floppy disk, renders about 20% faster than previous engines and has unlimited potential to be ported to other platforms. It's enough to make any Web developer giddy with anticipation and the project is attracting many contributors. Gecko could go beyond being a browser; it could become the glue that holds the new Web together.

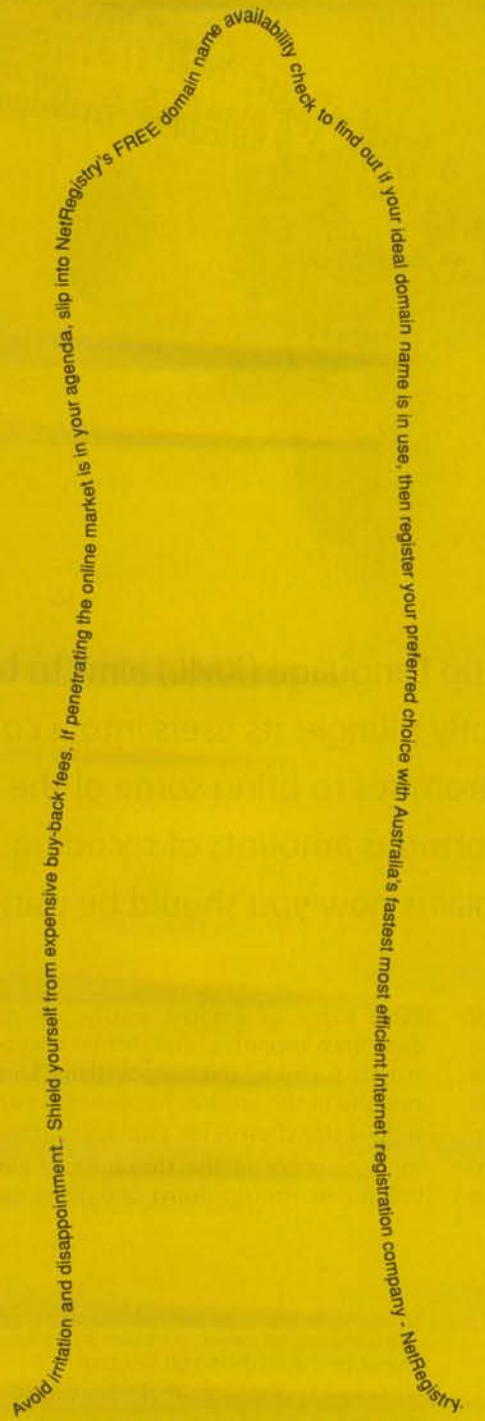
There is a perception that AOL's commitment to Netscape and the Mozilla project is lukewarm at best. It is hard to gauge how enthusiastic AOL is about the idea of an AOL-branded version of Communicator 5.0, but it would definitely like to see AOL content delivered to PDAs, set-top boxes, mobile devices and other Web appliances. This calls for a compact, standards-compliant embedded browser that can easily be ported to other platforms. Gecko is an obvious candidate for the role, and AOL would like to see as many developers as possible join the project.

The same approach is being taken with other Mozilla elements. Each module of the Mozilla project will be entirely constructed *from* the W3C standards. Each component can be cherry-picked and imported into any number of applications, including Web appliances such as WAP phones. Mozilla aims to transform the browser from simply a way of viewing the Web into a resource kit for the entire Web community.

Eric Krock, senior product manager for Netscape Communicator, said that Communicator 5.0 will be in complete compliance with W3C standards for XML, Document Object Model, HTML 4.0, cascading style sheets, and Resource Description Framework (RDF). Communicator 5.0 will also support Extensible User Interface Language (XUL, pronounced 'Zuul'), a subset of XML that allows elements of its user interface to be customised using simple Web building languages rather than sophisticated coding languages.

The buzz surrounding Communicator 5.0 has become louder, and it seems likely that 4.7 will be retired soon. Netscape 4.7 is an attractive prospect for the growing number of people who use an operating system that IE5.0 doesn't support, but it has few other advantages over IE5. It may be remembered as the browser that lost the war, but the battlefield is changing and there's still no telling which browser will come out on top. If the Mozilla project achieves all its goals, we could see the Gecko engine in everything on the Web. It would be as if Microsoft cut off Netscape's head only to find it replaced with 10 more.■

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FEATURE

XHTML: CRACKING THE CODE



Although Extensible Markup Language (XML) aims to bring flexibility and diversity to Net documents, it frequently plunges its users into a confusing world of DTDs and validation. Now XHTML promises to bring some of the benefits of XML to existing sites without requiring enormous amounts of recoding. **Angus Kidman** examines the new standard and explains how you should be using it on your Web site.

Ever since the initial introduction of XML in 1997, its proponents have patiently waited for the day when the majority of documents online would be presented in an XML-compliant language, and could take advantage of XML's ability to render effectively on a large range of devices, easily present data from specialist applications and be readily sorted by indexing systems. That nothing of the sort has happened is partially a reflection of the public's continuing ignorance of the standard (if you belong in the ignorant category, see 'What the hell is XML?' below for a rough and ready guide).

However, the lack of broad acceptance of XML also stems from one of the original difficulties with the standard. When it was first developed, there was no easy way to convert the millions of pages of existing HTML code

What the hell is XML?

The advantages of XML over HTML for developing online content are fourfold. First, because it provides a more explicit means of indicating the structure of different kinds of documents and the data within them, it makes it easier to index and access those documents. This is an important challenge in the text-heavy, information-poor environment that currently constitutes the Web. Second, because it draws a careful distinction between a document's logical structure and the physical format in which it appears, it is far easier to render an XML document than the HTML equivalent on a wide variety of devices (for instance, a PC monitor, a mobile phone and a screen reader for the visually impaired). Third, XML allows specific layout languages to be created for specialised applications, unlike HTML which has tended to try to be all things to all people. Finally, XML standardisation is tightly controlled by the World Wide Web Consortium (W3C), which should prevent those standards being debased by proprietary adaptations (although both Microsoft and Netscape are guilty of this with HTML, which is also a W3C standard).

For a detailed discussion of XML and how it works, see 'XML marks the spot', *APC* September 1997, page 113; a quick guide can be found in *APC* June 1999, page 144. Further details of some of the languages developed using XML can be found in 'Beyond XML', *APC* December 1999, page 133. These articles are archived on the apcmag.com Web site.



into an XML-compliant format. Without such a technique, the likelihood of XML being accepted — at least outside enterprise computing circles, where the general advantages of standardised markup languages were already recognised — was slim.

XHTML 1.0 provides a solution by redefining the existing HTML-4 standard (the same coding that is rendered by standard Web browsers such as Microsoft's Internet Explorer and Netscape's Navigator) as an XML application. This means that with just a little tweaking, existing HTML pages can be converted into a format that is readable in XML-compliant browsers, easing the way for the introduction of other XML variants in the future.

At the same time, those documents will remain readable in the millions of existing Web browsers that already litter the planet's PCs. As Tim Berners-Lee, the director of the World Wide Web Consortium (W3C) and the original developer of the Web, has put it, "XHTML 1.0 connects the present Web to the future Web."

Devil and detail

Developed by an authoring committee of 24 people from 18 different organisations, XHTML enjoyed a relatively speedy progress through the standards process; version 1.0 was made a 'recommendation' in January of this year (indicating that W3C members reached consensus that the specification is appropriate for widespread use). While

The golden rules

If you want your HTML documents to be accessible to both existing Web browsers and related applications (which rely on HTML-4) and future browsers for both PCs and other devices (which will use XML, and hence should be able to read XHTML 1.0 and future variants), then you need to follow these basic coding rules.

- **Include XHTML headers**
 The opening lines of your document should read as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtm"xml:lang="en" lang="en">
```

 The first two lines define the document as an XML document using the XHTML DTD. The third defines the XHTML namespace, and the language used in the document. Both the xml:lang and the lang attributes need to be included.

- **Don't improperly nest tags**
 The following text will render correctly in most HTML browsers, but is bad XHTML because the <a> and tags overlap:

```
<a href="doc.htm"><b>Click here for the background document</a></b>
```

- **Don't use upper-case letters in tags**
 While HTML allows both lower and upper-case tags, XHTML tags should be lower-case only. This also make them much easier to read.

- **Include all end tags**
 In HTML, you could simply use the tag to indicate a paragraph break, without the matching tag. This is a no-no in XHTML; you need to include both. The same principle applies to tags.
 If you use a tag that is empty, and therefore doesn't have an end tag (such as a horizontal rule <hr> tag), you have two options. You can include a fake end tag:

```
<hr></hr>
```

 However, because some HTML browsers can't handle this neatly, a better option is to use a trailing slash with a preceding space, which indicates to XHTML that the tag is complete and will be ignored by an HTML browser:

```
<hr />
```

- **Use quotation marks for attributes**
 Most HTML browsers don't need quotation marks to read a piece of code like:

```
<a href="doc.htm" target="_top">
```

 but quotation marks must be included with attributes in XHTML. All attributes must also be completed with an equals sign, ie. you must write

```
<dl compact="compact">
```

 rather than

```
<dl compact>
```

- **Replace the <name> tag**
 The tag, used to indicate a specific section of a document (such as a footnote), isn't supported in XHTML; it uses instead. To ensure compatibility, both tags can be used, as follows:

```
<a name="location" id="location">
```

- **Express ampersands in full**
 If you're including an ampersand in a text link (which might, for instance, invoke a CGI script) then you need to spell this out as & to ensure it works in XHTML.

Although some of these rules might seem arcane, they're fairly easy to adapt to if you make a concerted effort. As an added bonus, following these rules will almost invariably produce tighter, cleaner Web pages that don't cause you to scream with frustration because they haven't rendered correctly. Software can help ease the burden of conversion; check out 'Tools of the XHTML trade' on page 86 for some tips on automating the process.

Tools of the XHTML trade

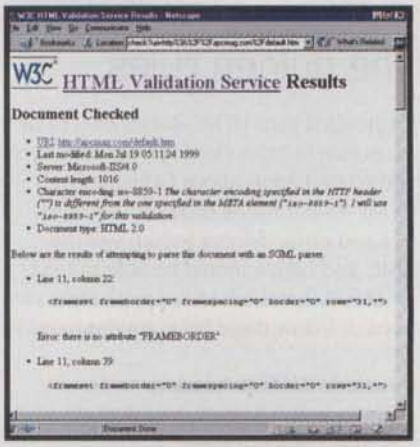
Although tools specifically designed to create XHTML are a little thin on the ground, there are plenty of tools designed to ensure that Web sites use HTML code that complies with the original W3C specification (the majority of documents on the Web don't). Using such tools, or general HTML checking utilities such as SiteHog, should eliminate most of the problems associated with converting documents, although you'll still need to add appropriate header information.

The W3C is promoting the virtues of Tidy, a freeware, open source utility developed by Dave Raggett (who also helped author XHTML). As Tidy uses a command line interface, it is less than user friendly. However, it is packed with useful features, including the ability to add your own tags and to automatically strip rubbish code from Word HTML documents. It also works well in scripts, and Raggett encourages people to use the source code to add Tidy's features to their own applications. There are ports of Tidy for all major platforms and some extremely odd ones.

If you just want to check the results of your own hand-tweaking, then the W3C also offers a free validation service at http://validator.w3.org/ (illustrated at right). If your code doesn't tightly conform, then you're likely to find this a rather soul-destroying experience.

If you want to create new pages in XHTML, then you're currently restricted to a couple of shareware applications: Mozquito Factory and XMetaL. However, other Web tool developers are expected to add support in coming months, and programs that don't alter the basic source code of pages (such as Macromedia's Dreamweaver) can be used to work on XHTML sites.

Tidy (in Windows, Mac and Linux formats), Mozquito Factory and XMetaL can all be found on this month's **apcmag.cd**. The CD also includes a copy of the full XHTML recommendation from the W3C in PDF format. Other ports of Tidy can be found at http://www.w3.org/People/Raggett/tidy/.



development work on new versions has already begun, the W3C has started campaigning for Web sites to convert to the new format, and it has put its money where its mouth is by converting its own site at http://www.w3.org/.

Because XML and HTML are both descended from SGML (Standard Generalised Markup Language), converting HTML code into XHTML isn't too difficult, providing you follow good practice in coding your HTML pages. Essentially, a couple of reference lines are required in the head of the document, which specify the DTD (document type definition) for XHTML 1.0. It isn't essential to understand how these work; they simply need to be included on each page.

Beyond that point, HTML-4 tags should work as normal, although there are exceptions (see 'The golden rules', page 85). Most of the difficulties that arise during conversion come about because XHTML enforces the XML requirement that coding is well formed. In particular, while most browsers aren't fussed whether you include opening and closing versions every time you use a tag (such as to switch on bold and to switch it off), XHTML insists that this is done all the time. Nesting tags is also a no-no.

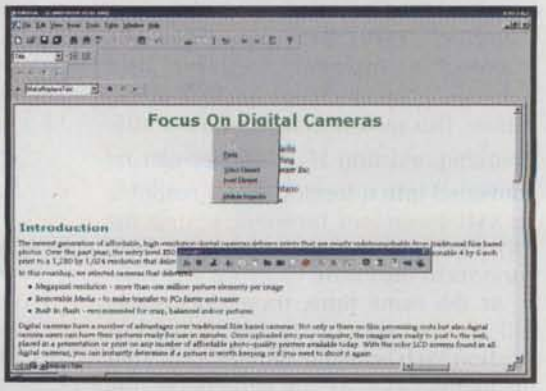
Pages developed using automated layout programs (such as Microsoft's FrontPage or the HTML conversion features in Office) may cause problems. While these packages are often quite rigorous in forcing you to always include opening and closing tags, this advantage is undermined by their tendency to produce bloated, unreadable and excessively complex HTML. Fortunately, there are utilities available to help cut out this excess coding (see 'Tools of the XHTML trade' at right for details).

Beyond XHTML 1.0

It's important to realise that making a document XHTML 1.0 compliant only scratches the surface of XML's potential. If you convert your pages, their appearance in a standard browser such as Internet Explorer or Navigator probably won't vary one iota. However, their appearance on non-PC devices is likely to be radically improved and it will be easy to add new XML-based features.

As the 1.0 numbering suggests, the W3C plans further additions to XHTML. Foremost among these are more elegant methods for allowing content developed in other XML languages (such as MathML) to be included within existing XHTML documents. As these come into place, XHTML will become more useful, but it will also be further removed from its HTML origins.

As a consequence, documents that conform to the standard may not render as readily on older browsers. By the time this becomes a problem, however, most browsers are likely to be shifting towards an XML focus anyway. It's also worth remembering that most Web developers have generally already consigned people who don't use the latest versions of the major market browsers to the scrapheap; change is still a constant in the world of online content.



Other plans for XHTML include dividing the specification into a series of modules, so that different devices can make use of the relevant parts of the standard without being overburdened with features they don't need. For instance, because developers of applications for mobile phones work with very small screen areas, they are unlikely to require extensive layout tags, and so they might be satisfied with a basic subset of the full XHTML specification. Modularising XHTML ensures that such subsetting doesn't occur in an ad hoc fashion, and helps ensure continuing interoperability. ■

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Performance



Browsing through past issues of *APC*, we were amused to see a bold heading from about nine years ago: '33MHz: Do we really need this?' The release of the 33MHz 486 was a milestone at the time. In the years since, jumps of 33MHz and more with each processor release became common, and now we are approaching the next processor milestone: 1GHz. Recently, Intel demonstrated a processor running at 1.5GHz. *APC* has assembled one of the last bunches of super PCs before the release of the 1GHz behemoths. And let us assure you, even though they're a few hundred MHz shy of the 1G target, they certainly do not lack oomph.

APC wanted the fastest and meanest machines available, so the systems reviewed range from 700 to 800MHz. The only stipulations were that the PCs submitted had to run Windows 98 (at the time of testing, Windows 2000 had only just been officially released) and have a minimum of 64M of RAM. Although 128M is becoming the new standard, *APC* kept the minimum requirement low to allow for budget systems. There were no price limits.

Expecting a range of machines, *APC* was pleased to receive five review systems, four of which run at 800MHz and one which runs at 733MHz. Their prices range from $3,500 to $6,500, but all of them are targeted at the home user or PC enthusiast.

Surprisingly, of the systems received, only one had an AMD Athlon processor; the rest were Intel Pentium IIIs. When the Athlon was released last year, it was immediately evident that it had superior processing power. Since that time, more manufacturers have turned to AMD and away from Intel, but now it's not just for performance reasons.

Hertz so good

Intel grossly underestimated demand for the high-end Pentium III and has not been able to keep up the supply. Gateway is one of the larger manufacturers to switch to AMD; it has gone so far as to publicly blame Intel for millions in lost revenue due to processor shortages. The shortages continue, and more and more manufacturers are turning to AMD. It

anxiety



The last time *APC* looked at PCs was in December 1999. At that time the fastest machines available ran at 600 to 650MHz. In just a few months, these machines have been left in the dust by new processors racing at 733MHz and beyond. Are the new speed demons good value? *APC* Labs put them to the test. **By Darren Ellis**

remains to be seen whether AMD can keep up with the unprecedented demand. At press time, Intel had just slashed Pentium III prices, and AMD followed suit with the Athlon.

Gateway attempted to provide *APC* with one of the first 850MHz Athlon systems in the country, but it was too late for this review.

APC did receive an 800MHz AMD Athlon system from AMD, which was tested alongside the reviews in the roundup. This system is not reviewed or included in the test result table, because the system is not commercially available. However, it demonstrated that a system with a middling configuration and an AMD Athlon can do extremely well in the benchmark suite. It earned equal second place in the Ziff-Davis CPUmark 99 and was equal first with the only other 800MHz Athlon system in the FPU WinMark 99 benchmark. For a system with an above-average 32M Xentor TNT2 Ultra video card, the Athlon processor was a distinct advantage. It managed to beat the 32M and 64M nVidia GeForce DDR-equipped machines in a few graphics tests, particularly the 3DMark 99 Max. The kick supplied by the Athlon was evident in the Quake III Arena tests, where it pushed the frame rates higher than normal. What's more, AMD had just released a 1GHz Athlon as *APC* went to press.

The Pentium III did not live up to Intel's hype, but manufacturers are still wary of AMD due to its reputation of not meeting demand.

So which processor manufacturer will eventually win out? Only time will tell, but a little competition never hurt anyone.

How we tested

To test the performance of the systems submitted for review, *APC* Labs used a combination of the Ziff-Davis Winstone 99 and the WinBench 99 suite of benchmark software, plus 3DMark 99 Max, 3DMark 2000 and BAPCo SYSmark 2000 from MadOnion. Other benchmarks were SPEC's Viewperf and Quake III Arena tests.

- **Winstone 99** runs a suite of modern business and graphics applications and records how long a system takes to complete these tasks, then gives an aggregate score.
- **WinBench 99** contains a set of sub-tests designed to find out how fast each component of a system really is.
- **Business and High-End Disk WinMark 99** provides a measure of how a system's hard disk handles a load equivalent to that demanded by the business applications used in the Business Winstone 99 test.
- **Business and High-End Graphics WinMark 99** measures the system's graphics performance when performing video tasks associated with common business applications, as well as demanding multimedia and 3D applications.
- **CPUmark 99** compares how fast the processor, memory and cache subnotebooks are.
- **FPU WinMark 99** is a 32-bit floating-point processor test.
- **3DMark 99 Max** and **3DMark 2000** tests 3D accelerators in a 'real world' environment. They are designed to simulate the conditions presented by games and other applications.
- **BAPCo SYSmark 2000** is an application-based system test that returns scores based on a system's performance with general business applications.
- **Viewperf** profiles OpenGL calls made by a set of workstation applications to test the 3D graphics capabilities of a system.
- **Quake III Arena** was run at three different resolutions and colour depths, and the average frame rate counted for each. This gaming test displays the system's ability to run gaming applications effectively.

All the systems tested were shipping versions available to the general public at the time of publication unless otherwise stated. Because of the lead time between testing the machines and publication, some specifications and pricing may have changed. Check this information with the retailer before purchase.

These tests were performed without independent verification by Ziff-Davis, and Ziff-Davis makes no representation or warranties as to the results. WinBench is a registered trademark of the Ziff-Davis Publishing Company.

Dell Dimension 800B



Now and then a system comes along that, for one reason or another, has *APC* drooling. In the case of the Dimension 800B, it wasn't the casing (Dell systems all look much the same) but the performance and specifications. With the 800B, Dell has packed in the latest components at very attractive prices.

The Dimension 800B is one of three PCs reviewed here which feature the 800MHz Pentium III processor, and is the first that *APC* has seen with the Intel 'Camino' i820 chipset and Rambus memory. This chipset is notorious for causing Intel no end of trouble and release delays. The system did prove to be a little finicky at times, but with a little coaxing it returned some good test results. It was fastest in the CPUmark 99 test and first by a huge margin in both the hard drive tests.

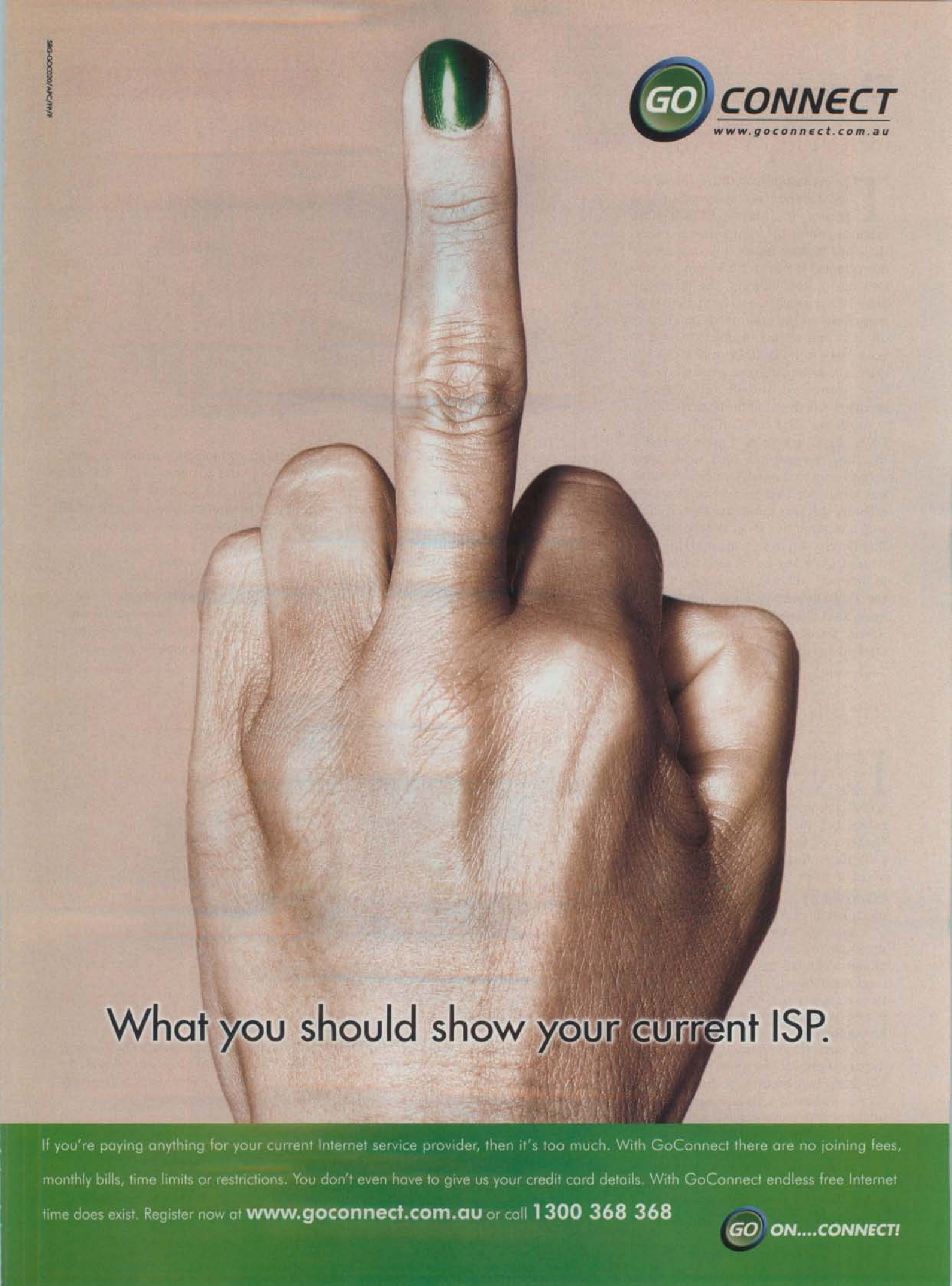
The system comes with a 19in monitor, and a Sound Blaster Live soundcard with a booming Altec Lansing ACS-340 speaker and subwoofer set.

The highlight of the Dimension 800B is the graphics card — an nVidia GeForce 256 with DDR memory (see First Take, page 34 for a review of another card with the nVidia GeForce 256 chip). What's more, the Dell's card has 64M of RAM, twice that of other top consumer-level 3D cards.

In both of the 3DMark tests, the Dimension 800B trounced every other system — even the Pioneer 2000 Power System, which has an AMD Athlon and a 32M GeForce DDR card. The frame rates within the Quake III Arena tests were also extremely high, including a playable 22.3fps at 1,600 by 1,200 in 32-bit colour.

In the Ziff-Davis Business Graphics and High-End Graphics WinMarks it was neck and neck for first place between this system and the Pioneer, proving that the 800B is no slouch at 2D either.

Contact	Dell
Phone	1800 292 313
Price	$4,558
Online	http://www.ap.del.com/au/
In short	An excellent machine, with impressive test results and a low price.


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Gateway Performance 800XL



The Performance 800XL is one of the most expensive systems in this review. It's almost $2,000 more expensive than the competitively priced Dell, but it does have some impressive advantages. It has a 21in monitor (the Dell has a 19in monitor, the others all have 17in screens), a 34G hard drive (14G more than all the other PCs) and, best of all, it is one of two models reviewed to have both a DVD-ROM and a CD-RW drive. The system also has a Sound Blaster Live soundcard and Boston Acoustic speakers, which sound fantastic.

With its 32M nVidia GeForce 256 DDR, the Gateway is a great graphics machine. Its graphics tests scores were second only to the Dell Dimension 800B, but since the Dell has twice the DDR memory this was to be expected. It rated well in both of the 3DMark tests and the Ziff-Davis Business and High-End Graphics WinMarks. It fared reasonably in Viewperf, although it was behind both the Dell Dimension 800B and the Pioneer 2000 Power System. The Quake III Arena results were also good, but it choked at the higher resolution and returned a very low frame rate — the lowest by far.

The other test results were excellent. The hard drive was second to the Dell with its very high Business Disk and High-End Disk WinMark scores. It scored second in the CPUmark 99 test, equal third in the FPU WinMark 99 test and equal first in the Business Winstone 99 test.

Gateway is aiming this system squarely at home enthusiasts, and it is an excellent machine for this market. It has everything you need for movies at home or games, and includes a CD-RW and enough hard disk space to keep anyone happy. It would also make a great small business workhorse.

Contact	Gateway
Phone	1800 500 742
Price	$6,499
Online	http://www.gw2k.com.au/
In short	Expensive, but there's plenty to justify the price tag.

Intelligent Printing Systems P-60



Intelligent Printing Systems was the only manufacturer to submit a PC for this review that did not have an 800MHz processor. *APC* specified that PCs submitted for this roundup must be 700MHz or faster. The IPS P-60 has a 733MHz Pentium III processor which sets it apart it from the pack internally, and externally it's as different from the other machines as chalk and cheese.

Computex 1999 in Taiwan was a giant showcase for PC peripherals and iMac-style brightly coloured translucent plastic finish cases. The P-60 is the first system with one of these cases to reach *APC*. Its attractive blue plastic case is easy to open which is helpful for upgrading.

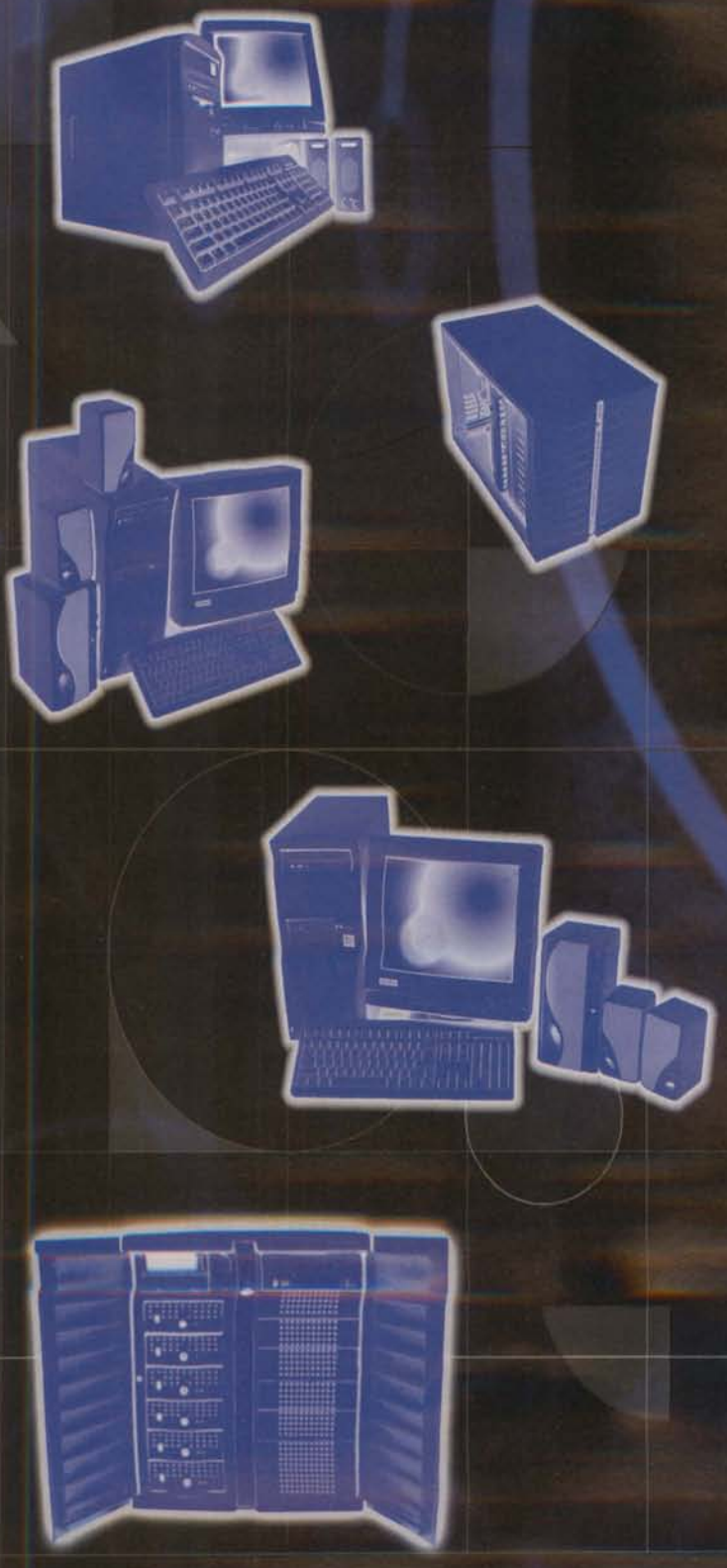
In terms of performance, the P-60 produced reasonably low scores in most of the Ziff-Davis benchmarks. It didn't stand a chance against the other machines. They all have faster processors and, with the exception of the Packard Bell Platinum 800, they all have better graphics cards.

The graphics card in this system is the Diamond Viper II with a Savage2000 chip. This is a good system for playing games; it had faster frame rates for Quake III Arena at higher resolutions than the Gateway and the Packard Bell machines. On the downside, the system ran last in both 3DMark tests by quite a large margin. As expected, the system trailed in the Ziff-Davis CPUmark 99 and FPU WinMark 99 tests.

The P-60's 20G hard drive was slowest in the High-End Disk WinMark 99 test and second last in the Business Disk WinMark 99. The P-60 is also the only system reviewed that did not have a DVD drive; it had a 40x CD-ROM instead. All told, the P-60 is actually a very good system with an appealing price.

Contact	Intelligent Printing Systems
Phone	(02) 9923 1777
Price	$3,490
Online	http://www.ipspty.com.au/
In short	Quite a good system for 733MHz.

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AVC-9100001

Packard Bell Platinum 800

Packard Bell has never laid claim to the 'performance computing' title, focusing instead on developing family-friendly systems. The Platinum 800 is at the high-end of Packard Bell's PC range, but it has several flaws.

Firstly, it's expensive for the specifications. For a system with a price of more than $5,000, it's incongruous that it only has a TNT2 video card, especially when you consider the huge performance leaps available with the nVidia GeForce. Failing that, a 19in monitor or bigger hard drive would have increased the system's appeal.

Its graphics results are comparable with other TNT2-based machines *APC* has tested in the past, but compared to the other systems in this roundup, the Platinum 800 falls short of the mark. It's fast enough for playing games, but for the price, you shouldn't have to settle for second best. However, the Platinum 800 performed better than the P-60 in most of the graphics tests, although the IPS P-60 has a superior graphics card. In the 3DMark benchmarks the difference was considerable, but in the Quake III Arena test it trailed the pack. Its average frame rate of 28.8fps at 1,024 by 768 in 16-bit colour is good enough, but it may drop below that rate during intensive gameplay.

In the other benchmarks, the system scored second last in the Ziff-Davis CPUmark 99 and last in the Business Winstone 99, but surprisingly rated second fastest in the FPU WinMark 99 test, behind Pioneer's 800MHz AMD.

Despite its patchy performance, the Platinum 800 is not a bad system; it has redeeming features such as a CD-RW drive and a DVD-ROM. The audio is reasonable, but it relies on monitor-mounted speakers. The Platinum 800 could be extremely handy for the home or small business, but it is hard to pick what it would be best suited for. Packard Bell is positioning the Platinum 800 as a consumer PC, and has packaged it with a huge software bundle, but the system falls short of the mark in places.



Contact	Packard Bell
Phone	(02) 9700 5052
Price	$5,299
Online	http://www.packardbell.com.au/
In short	A little overpriced, but it has some good features.

Pioneer Computers 2000 Power System

Pioneer Computers was the only manufacturer to submit an AMD Athlon-based system for review.

The 2000 Power System has an 800MHz processor and a 512K level 2 cache. With the Athlon's number-crunching abilities, it was no surprise that it aced the Ziff-Davis FPU WinMark 99 test and came a close third in CPUmark 99.

The 2000 Power System clearly has the edge on the Gateway Performance 800XL, which features the equivalent Intel chip, the same amount of SDRAM and a 32M nVidia GeForce video card. The system scored highly in all three of the Quake III Arena tests, where it was second only to the Dell Dimension 800B. It also came second in the 3DMark 2000 test, third in 3DMark 99 Max and performed well in both of the Ziff-Davis Graphics WinMarks.

The 2000 Power System came second in the Business Winstone 99 test, and its 20G hard drive was middle of the pack in both disk tests.

The system has an 8x DVD-ROM drive, a Sound Blaster Live soundcard, and an excellent Altec Lansing ACS-33 speaker and subwoofer set. Although not as strong as the Altec Lansings that come with the Dell Dimension 800B, these are still more than powerful enough and make for great DVD audio. The system comes with a 17in monitor, but the low price makes an upgrade to a 19in monitor an option. Considering its strong features, this system is respectably priced at $3,800 and has everything the home enthusiast could ask for.



Contact	Pioneer Computers
Phone	(02) 9690 2888
Price	$3,800
Online	http://www.pioneercomputers.com.au/
In short	An inexpensive system with good components.

Editor's Choice

Dell Dimension 800B

For sheer power you can't go past the Dell Dimension 800B. With the fastest graphics card *APC* has ever tested and top-of-the-line specifications, this system would be a welcome addition to any home.

Highly commended
Pioneer Computers 2000 Power System

Pioneer Computer's 2000 Power System is another high performer, this time with a few less features and a lower price. This system would be ideal for those looking for a power machine on a limited budget.

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COMPUTERS AUST. & NZ

Editor's Choice apcmag | pc world BEST BUY | PC AUTHORITY SPEED | PC MAGAZINE AUSTRALIA EDITORS' CHOICE

SOHO & POWER PC AND NOTEBOOK





MENU

Pioneer 2000 SOHO PC

Celeron 466:	$1590
Celeron 533:	$1690
Pentium III 550E:	**$1890**
Pentium III 600:	$1990

Supermicro SBA BX M/B
64 M PC100 RAM
13.6 GB HDD IDE 7200 RPM
Diamond S540 16M AGP VGA
Creative Vibra 128 sound card
Macase ATX GLOSSY Midi Tower
480W SPEAKER,
MITSUBISHI 40X CDROM, 1.44M FDD
MITSUBISHI 15" Monitor
MITSUBISHI K/B, Mouse, Win 98,

Pioneer 2000 Power PC

Pentium III 600:	$2770
Pentium III 733:	$3160
AMD K7 750:	**$2990**
AMD K7 850:	**$3790**

Supermicro PIIISCD 820 M/B(K7-MSI)
128 M PC100/133 RAM
20 GB HDD IDE 7200 RPM
MATROX G400 32M AGP DAUL HEAD
Creative SB LIVE value digital card
Macase ATX GLOSSY Midi Tower
600W SubWoofer SPEAKER
10X DVD IDE DRIVE, 1.44M FDD
MITSUBISHI 17" Monitor
MITSUBISHI K/B, Mouse, Win 98,

Pioneer 2000 Server

Pentium III 550:	**$2830**
Pentium III 600:	$2940
Pentium III 700:	$3340
Pentium III 800:	$3860

Supermicro SBU 2940U2W BX M/B
128 M ECC PC100 RAM
IBM 9.1GB SCSI LVD HD
Diamond A55 8M AGP VGA
40X SCSI CD ROM, 1.44 FDD
Macase ATX Full Tower
INTEL 10/100M NETWORK CARD
MITSUBISHI 15" Monitor
MITSUBISHI K/B, Mouse,
OPTIONAL: WIN NT SERVER V4

Pioneer 2000 Slimbook

SlimSoho Celeron 466:	$2650
SlimPower Pentium III 500:	$4130

SlimSoho:12.1"TFT, Only 1.9 KG
32M RAM, 6 GB Ultra DMA HD
SlimPower:14.1"TFT, Only 2.5 KG
64M RAM, 12GB Ultra DMA HD
All with :
24 X CD Rom, 4M VGA
3D Audio Stereo System
56k Modem and 1xType II PCMCIA
MS Windows 98 CD

Pioneer 2000 Sohobook

Celeron 466:	$2690
Pentium III 550:	$2990
Pentium III 650:	$3190

32M SDRAM
6 GB Ultra DMA HD
4M 128 Bit ATI Graphic
24 X CD Rom
12.1" TFT LCD
3D Audio Stereo System
Microphone & Speaker
1 Type III / 2 Type II PCMCIA
MS Windows 98 CD
TO ADD: 32M RAM +$99
14" TFT, 56K MODEM: +$690

Pioneer 2000 Powerbook

Pentium III 450:	$4390
Pentium III 500:	$4490

64 M SDRAM
12 GB Ultra DMA HD
8M 128 Bit Graphic
DVD Drive
14.1" TFT LCD 1024X768
3D Audio Stereo System
Microphone & Speaker
1 Type III / 2 Type II PCMCIA
MS Windows 98 CD

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Published by ACP Tech, a division of ACP Publishing Pty Limited
A.C.N. 053 273 546

Source Code: APCB0400

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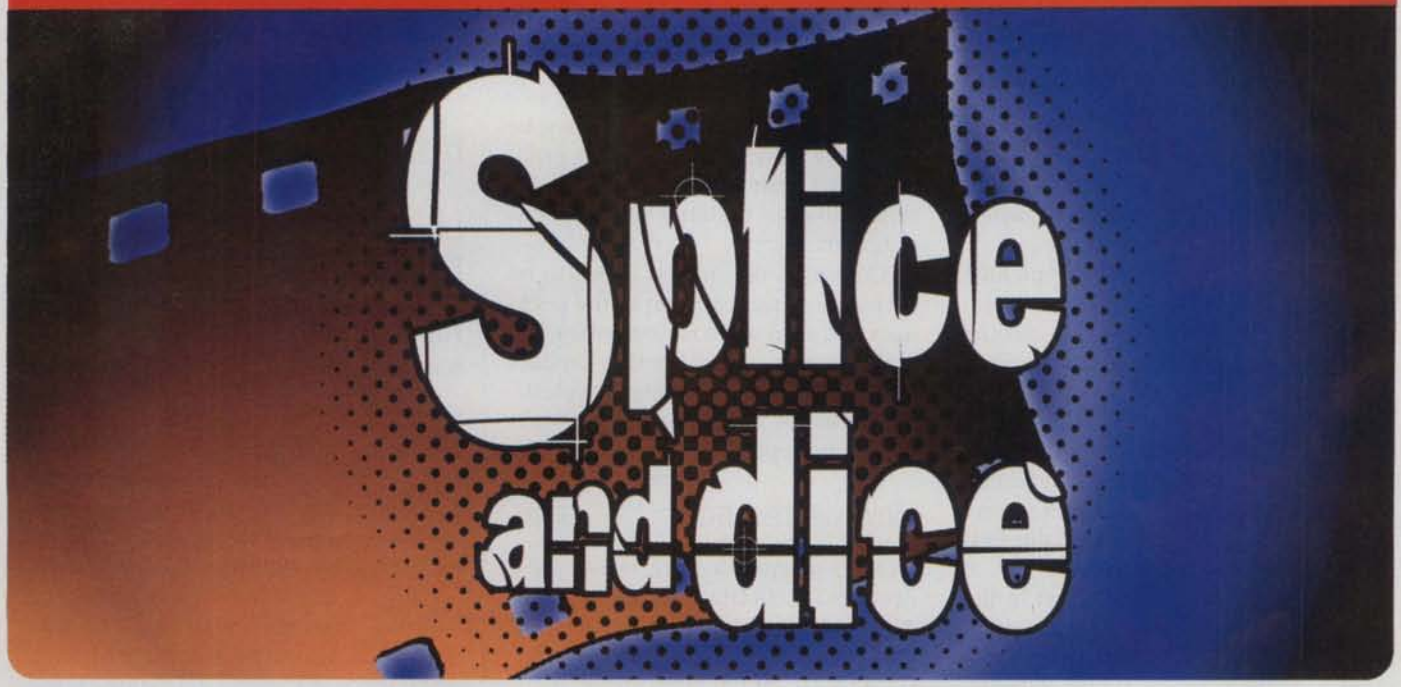
DPSC – APC0400

Specifications and results: 700 to 800MHz PCs

Product	Dimension 800B	Performance 800 XL	Platinum 800	Pioneer 2000 Power System	IPS P-60
Distributor	Dell	Gateway	Packard Bell	Pioneer	Intelligent Printing Systems
Phone	1800 292 313	1800 500 742	(02) 9700 5052	(02) 9690 2888	(02) 9923 1777
Online	http://www.ap.dell.com/au/	http://www.gw2k.com.au/	http://www.packardbell.com.au/	http://www.pioneercomputers.com.au/	http://www.ipssty.com.au/
Price	$4,558	$6,499	$5,299	$3,800	$3,490
Processor	Pentium III 800MHz	Pentium III 800MHz	Pentium III 800MHz	AMD Athlon 800MHz	Pentium III 733MHz
Secondary cache (K)	256K	256K	256K	128K	256K
Tested/maximum RAM (M) and type	128M SDRAM (384M max)	128M SDRAM (384M max)	128M SDRAM (384M max)	128M SDRAM (768M max)	128M SDRAM (768M max)
Hard disk	20G Ultra ATA/66	34G Ultra ATA/66	20G	20G IBM Ultra ATA/66	20G IBM Ultra ATA/66
Hard disk controller	Intel 82801 AA Bus Master	Intel 82371AB/EB PCI Bus Master	VIA Bus Master PCI IDE	AMD-756 Bus Master IDE	VIA Bus Master PCI IDE
Hard disk file system	FAT32	FAT32	FAT32	FAT32	FAT32
Graphics card	nVidia GeForce 256 DDR	nVidia GeForce 256	WinFast 3D S320II	nVidia GeForce 256	Diamond Viper II
Video bus type	AGP	AGP	AGP	AGP	AGP
Video RAM	64M SDRAM	32M	32M	32M	32M SDRAM
Video controller chip	nVidia GeForce 256	nVidia GeForce 256	nVidia Riva TNT2 Pro	nVidia GeForce 256	S3 Savage2000
Graphics driver name and version	NVDISP.DRV 4.12.01.0375	NVDISP.DRV 4.12.01.0369	NVDISP.DRV 4.11.01.208	3DBGFW9X.DRV 4.12.01	SAVAGE2K.DRV 4.12.01.90002-9
Monitor	19in Dell	21in Gateway	17in Packard Bell	17in Mitsubishi	17in Mitsubishi
Tested resolution /colour depth /refresh rate	1,024 by 768/16 bit/ 85MHz	1,024 by 768/16 bit/ 85MHz	1,024 by 768/16 bit/ 85MHz	1,024 by 768/16 bit/ 85MHz	1,024 by 768/16 bit/ 85MHz
CD/DVD-ROM drive	8x DVD	12x DVD and CD-R	8x DVD and CD-RW	8x DVD	40x CD-ROM
Soundcard	Sound Blaster Live	Sound Blaster Live	PCI288-Q3D	Sound Blaster Live	Sound Blaster Vibra PCI
Speakers	Altec Lansing ACS-340 speakers and subwoofer	Boston Acoustics BA7500 speakers and subwoofer	Altec Lansing speakers and subwoofer	ACS-33Genius satellite and subwoofer	
Modem	56K internal	56K internal	56K internal	No	56K internal
OSes available	Windows 98	Windows 98/2000	Windows 98	Windows 98/2000/NT, Linux	Windows 98
Warranty	3 years limited	3 years RTB parts and labour	1 year limited hardware	2 years parts, 5 years labour	1 year onsite
Bundled software and accessories	Microsoft Works Suite 2000, Norton AntiVirus 2000	Microsoft Works Suite 2000, DVD Adventure Suite, Norton AntiVirus	A huge software bundle of games, productivity tools, utilities and so on	Norton AntiVirus	100 hours Internet access and BitWare fax software

Distributor	Dell	Gateway	Packard Bell	Pioneer	Intelligent Printing Systems
Business Graphics WinMark	346	321	301	339	275
High-End Graphics WinMark	996	950	881	1,033	573
Business Disk WinMark	6,870	6,060	3,640	4,913	3,900
High-End Disk WinMark	20,500	17,967	11,300	16,800	7,470
CPUmark 99	71.1	69	61	68	60
FPU WinMark 99	4,210	4,210	4,293	4,350	3,930
Business Winstone 99	32	32	28	30	29
3DMark 99 Max	7,032	6,887	5,783	6,651	4,251
3DMark 2000	4,630	4,055	2,807	4,536	2,514
Viewperf AWADVS (fps)	73.6	69.82	15.7	79.13	9.92
Viewperf DRV (fps)	29.44	22.08	7.85	27.72	6.41
Viewperf DX (fps)	39.06	31.67	12.87	37.93	6.86
Viewperf Light (fps)	3.76	3.47	1.81	4.048	1.45
Viewperf ProCDRS (fps)	0	0	11.52	13.4	0
Quake III Arena 640 by 480 at 16 bit (fps)	100.1	91.7	59	95.1	65.2
Quake III Arena 1,024 by 768 at 16 bit (fps)	60.5	44.3	28.8	62.2	47
Quake III Arena 1,600 by 1,200 at 32 bit (fps)	22.3	5.8	10.6	21.5	19.3
SYSmark 2000	163	153	136	133	158

VIDEO EDITING SOFTWARE



Last month, *APC* showed you some of the best products for capturing video. This month, **Chaim Mehlman** takes you through the best software for editing digital film.

In a famous 1920s Russian experiment, a film-maker showed audiences a close-up of an actor's face, combined with shots of a funeral, food and a pretty girl. Audiences remarked on the power of the actor's performance — how well he portrayed grief, hunger and love respectively. But the actor's face was the identical deadpan shot in every scene! The Russians concluded that editing is the whole of film-making. Not all agree. However, editing can be the most creative and the most time-consuming part of video production.

Today's computer editing tools give video professionals, and even the home enthusiast, capabilities that were out of reach a few years ago. There are vast differences between the tools — differences that play a major role in determining the amount of time spent editing, as well as the visual outcome.

Broadly speaking, the products on the market fall into three categories. The first is for professionals in the video industry, from wedding to corporate video-makers. The second category is for home video enthusiasts who want to trim down hours of video to create entertaining home movies. A third and newer segment of product exists for those producing movies for Web sites or for transmission via email.

The major issues

The main objective of an editing system is to facilitate, not break, your creative flow. A dream package would combine capability with simplicity, but simplicity is relative. You can't expect software to be extremely simple and still do everything you need to do. To some extent, once you're familiar with the way your software works, you can proceed efficiently without thinking about the interface (like speaking a language once you've learned it). However, if there are too many steps and too many details to remember you will end up wasting a lot of time — and editing is already time-devouring.

Efficient use of screen space is always a compromise. The monitor doesn't have enough room on it to fit everything you need to do, and windows are constantly fighting each other for space. *APC*'s reviews give considerable attention to how the video editing packages use screen space.

Scene trimming and basic assembly (rough cut) was simple and straightforward on most of the packages *APC* tested. The differences arose in the way programs handled the subsequent functions.

Many packages require rendering or building of preview files before effects can be viewed in a complete form. With others, you can simply render each effect as you go. Some require audio changes to be rendered; others don't. With programs that require more rendering, you need to develop efficient working habits. You could discipline yourself not to render at all until you finish a sequence or even a whole video, then leave the computer to render. That way, you wouldn't waste time waiting for renders. Well, that's the theory. Sometimes you need to view an effect before proceeding, to see if it affects the overall timing or mood of the video. In practice, you would use a combination of the two methods, so you would want a package that can handle both approaches.

Many packages use keyframes to build effects. This is a brilliant concept borrowed from film animation. Whenever Wile E Coyote found himself in mid-air over a gorge, he would do a double take before falling. The head animators would draw only the first and last frames (keyframes) of the double take, leaving it to the assistants to fill in the stages between. Similarly, when building a complex effect, you specify only the beginning and end of any change, and the computer fills in the intermediate frames.

For example, if you want a title to change colour smoothly from red to green to yellow at intervals of one second, you would create keyframes one second apart then specify the target colour at each keyframe. The same

applies to motion or any other effects. Keyframes can be moved, deleted or copied along the timeline. This gives you complete control of how and when effects are achieved.

The products in this review include both consumer and mid-range professional packages. These are two distinct categories, which reflect different requirements. Consumer and Web video-makers want quick editing, some impressive effects, and minimum complexity. Professionals need multiple video and audio tracks, great flexibility and split-second precision. So far, there is no package that satisfies the needs of both groups.

The category is indicated next to the product name in each review. It's worth noting that many video capture cards come with basic video editing software, some of which has not been reviewed here. Products such as Avid Cinema and MGI VideoWave are usually available only as companions to retail capture cards, and were not reviewed for this reason.

Most packages *APC* reviewed are generic in that they don't come bundled with, or are not dependent on, any particular hardware. This excludes quite a number of high-end professional packages and basic consumer packages. Others work with a variety of capture or 1394 cards. Last month's article (see *APC* March, page 114) emphasised the importance of having a knowledgeable dealer build your hardware/software package. *APC*'s testing showed some products were sensitive to the hardware used. Because video editing is so complex, it can be extremely difficult to diagnose problems. It's best to have one dealer responsible for building you a combination that works.

Currently, the market seems to be in a state of flux. Several of the packages *APC* wanted to review were withdrawn recently, and another product failed to arrive despite many requests. You would be wise to choose an established and reputable brand.

How we tested

The PC programs were tested on a Pentium II 400MHz, with about 60G of AV-rated hard drive space. The Mac programs were tested on a PowerMac G4 with 27G of hard disk space.

Each product was tested using an identical video project. The video was relatively basic; it required frame-accurate trimming and assembly, some scene transitions and effects, titles, a commentary and background music. All sound sources had to be mixed to appropriate levels at different stages.

Each package's capabilities were noted: whether it could perform each function, and how efficiently and intuitively it achieved it. Careful note was taken of how conducive each interface was to efficient workflow, beyond the immediate requirements of our simple project. Any outstanding capabilities, deficiencies or quirks were also noted.

Editor's Choice



Ulead MediaStudio Pro 6.0

Highly commended
Apple Final Cut Pro

Given its range of features, combined with its moderate, all-inclusive price for a true professional tool, Ulead MediaStudio Pro and its suite of programs is a clear winner. Its habit of rendering at the drop of a hat will inevitably waste some time, but this doesn't outweigh its very impressive capabilities.

Both Adobe Premiere and Apple Final Cut Pro are fully featured and well designed, supported by years of use and feedback from professionals. Final Cut Pro, which came out slightly ahead in *APC* testing, has the most efficient rendering system, while Premiere benefits from a large range of third-party plug-ins. Both packages are much more expensive.

APC did not award a winner in the consumer products category due to the small range of products available for review. With their lower price tag, however, these products could be more than adequate for home and Internet video-makers.

It's important to try products before you buy where possible. Trial versions of video editing software can be found on the March issue's cover CD.

Glossary

1394 (or IEEE 1394) Also known as FireWire (Apple) and iLink (Sony), this is the de facto standard interface for transferring video from a digital video source to a PC.

Batch capture The ability to record (capture) scenes from an entire tape to disk automatically, from a list of 'in' and 'out' points marked by the user.

Chroma key A method of overlaying an object or actor on a background scene filmed elsewhere.

Clip A video or audio scene, stored as a file on disk.

DV (Digital Video) A digital recording standard adhered to across most brands. Connection between devices is handled by an interface known as IEEE 1394, FireWire or iLink.

Intelligent rendering Some software has the ability to render only scenes changed during editing, not the entire movie — this saves time and disk space.

Rendering The frame by frame drawing of the final movie by the software. Depending on the software, the rendering can consist of either a total redraw of every frame (which is bad), or only effects, titles and so on, not present in the original capture.

Ripple, roll, slip and slide Ripple editing is like insert typing; the rest of the timeline is pushed or pulled into place. A roll edit is like typeover typing; some of the timeline is overwritten. Slip and slide refer to how parts of the incoming clip are handled.

Rubber band Audio represented onscreen as a line. This can be moved up and down at chosen points to alter the volume of the sound — the preferred method of audio manipulation.

Timeline A window that displays the scenes in the assembled movie in sequential order along a left-to-right line. Composed of several tracks representing video, audio and effects.

Transition The change from one scene to another. Infinite variations exist — cuts, dissolves, wipes, spins, 2D and 3D effects.

Adobe Premiere 5.1 (professional)

Premiere has long been an industry standard. One of its biggest advantages is the large range of third-party plug-ins available that extend its capabilities way beyond the basic program itself — not that the basic program lacks features.

The requirements of professional editing are fully implemented in Premiere, including all the ways of changing timeline elements — ripple, roll, slip and slide. The manual gives an excellent illustrated explanation of these elements. Premiere also uses intelligent rendering, but you have to specify which part of the timeline to render by selecting a preview area. This is not too big a problem, since anything already rendered in that section won't be re-rendered unnecessarily. Rendering speed has been improved since version 4.

Audio control is solid, with reasonably sized rubber bands, visible waveform and a number of useful tools. For example, there's a crossfade tool, which fades between two tracks with just two clicks — no dragging. You can drag a whole section of the rubber band in one go, setting a level without having to match the positions of two separate handles. For precise control, you can see the amount of volume change in decibels.

The screen is highly configurable; the source and program monitors can be adjusted in size without losing any functions. This allows you to show more tracks in the timeline. Tracks not immediately required for editing can be hidden, further reducing annoying and time-consuming scrolling. You can order the long list of transitions so the ones you use most often are uppermost and easy to access — ones you never use can be hidden away.

You can also trim an entire project, removing unused clips and unused portions of clips, as well as recovering disk space. This is similar to MediaStudio's Smart Trim feature, although a little less immediate in its effect — and a little less risky — since you would normally do it only after a project is completed and ready for archiving.

The manual is very comprehensive. The explanations tend to be a little lengthy, but if you just want to get on with work, you can get started quickly with the tutorial.



Platforms	Windows and Macintosh
Contact	Adobe
Phone	1300 550 205
Online	http://www.adobe.com/
Price	$1,295
In short	Solid and fully featured, with years of experience and plenty of support.

Apple Final Cut Pro (professional)

This package is certainly one of the most comprehensive available. Virtually everything is possible, and with great precision. Sometimes speed and intuitiveness are compromised for this precision, but this software is designed for precision editing, so it's worth the sacrifice.

Customised effects can be built into many packages. However, Final Cut Pro goes way beyond that; it features a scripting facility for building *sequences* of effects. These can then be implemented in the same way over different parts of a video, or different videos. For example, imagine a title sequence for a video series in which clips fly in and out, change colours, and include moving text and stills. Saving this as a script means you could repeat the exact sequence any number of times, with some or all of the elements changed to suit each version.



A batch capture module in the program has many features for organising clips. The monitor that shows the incoming content from a digital source is large and clear, but the device control allows only play and rewind — not fast or slow shuttle. The buttons for setting in and out points are tiny and far apart, so you have to move the mouse (and your eyes) backwards and forwards each time, while trying to watch the monitor for content. You can press the I and O keys for in and out, but there's no keyboard shortcut for accepting a clip into the list, so you have to use the mouse.

The Source and Canvas monitors can be sized down, and the timeline enlarged. Projects can be separated into Sequences, which appear as tabs. This lets you work on a shorter timeline, reducing sideways scrolling. It also lets you rearrange the order of sequences — an enormous benefit.

This is the easiest rendering interface of all those reviewed; new scenes can be added 'With Transition' to streamline the assembly process, and single effects — or the entire sequence — can be rendered with two mouseclicks. There is also a large range of professional audio filters, including reverb, echo, parametric equaliser, hum remover, vocal de-esser and de-popper, as well as compressors and expanders.

The tutorial in the manual takes you through most of the standard functions. It also shows you how to construct a complex title sequence, with layers of video and flying text. The tutorial gives some idea of what's possible and how much time and care it takes.

Platform	Macintosh
Contact	Apple Computer
Phone	13 36 22
Online	http://www.apple.com.au/
Price	$1,595
In short	Precise and powerful; its features show obvious input from professionals.

Digital Origin EditDV 1.0 (professional)

This package comes with its own DV capture card for hardware and software compatibility. The software can be purchased separately, but it requires a Digital Origin 1394 card, so it might be worth purchasing the entire package.

The capture software is clear and simple, providing the full device control of a digital camcorder: play, stop, fast and slow shuttle, even single-frame advance. Batch capture isn't supported, but it is promised for the future.

The editing program handles most professional requirements, including three and four-point editing, backtiming, split edits, ripple, roll and slip edits. The onscreen function buttons are clear and bold and all effects can use keyframes for precise control.

EditDV is a solid package, but some features are not ideal. The rendered video is stored in separate video and audio Program Tracks in the timeline. You could have more than one set of Program Tracks, allowing several rendered versions simultaneously. To see and hear the final output recorded in the Program Tracks, you have to keep switching the 'work' tracks off. Worse still, the Program Tracks use precious vertical screen space, and clutter the timeline.

The Source and Program Monitors, use over half the screen height. Enlarging the timeline obscures the controls on the Monitors, forcing you to scroll a lot. Resolution in the Monitors is selectable, but only the highest resolution is watchable. This slowed the display unacceptably, even on a relatively fast machine. It's best to select high resolution while playing only every second frame.

To alter audio levels, you drag a 'filter' into the audio FX track for each clip you want to manipulate. A rubber band appears for that clip only. Altered audio must be rendered. The rubber band, however, is a decent size, and you can see the waveform.

EditDV has intelligent rendering, but you still have to specify which sections of the timeline to render, or the program will re-render previously rendered effects. You can also use keyboard shortcuts extensively. The package includes keyboard stickers with the same button icons that



appear onscreen. The Windows version doesn't support some shortcuts.

Platforms	Windows and Macintosh
Contact	Conexus
Phone	(02) 9975 2799
Online	http://www.digitalorigin.com/
Price	$1,065, or $1,775 with Digital Origin 1394 card
In short	A professional package, some features need perfecting.

Digital Origin EditDV Unplugged (consumer)

This is EditDV 1.0, minus a few features. The features that are included work in the same way as in the full program. The interface is identical in both versions.

The most important feature that it lacks is the ability to add video and audio tracks to the timeline. EditDV Unplugged contains only one video track and two audio tracks. This means camera audio plus music or commentary only, giving it fewer tracks than most consumer programs. This is the only consumer package *APC* saw that has rubber band audio control. However, the lack of tracks creates the anomaly of a virtually professional package with one less-than-amateur limitation built in. For this reason, it would be more appropriate to describe it as a trial version than a separate consumer-level product.



You can easily freeze frames and change the speed of a clip (to fast or slow motion) by using the Fit to Fill feature, and inserting a clip that's too long or short for the space. You can also reverse clips. The program provides clip sync information when you're editing picture and sound independently, in case they go out of synchronisation. It's then easy to restore sync.

To trim a clip in the timeline, you can use the special Trim Window, which shows you the in and out points of the respective clips as they change according to your selected cut point. The option to drag the ends of a clip in the timeline itself is not available, and there's no scissors or razor-blade tool to split a clip. This is inconvenient, because it's something you often need to do.

It is complicated to split a clip in EditDV Unplugged. You have to create two instances of the clip in the source monitor, making sure your out point in the first is exactly one frame before the in point of the second. On the other hand, the titler is simple to use and quite capable. You can give titles shadows, gradients and complex movements using keyframes.

The PDF manual supplied with the product is excellent. It's clear and well illustrated, and often shows you more than one way of achieving the same effect.

Platforms	Windows and Macintosh
Contact	Conexus
Phone	(02) 9975 2799
Online	http://www.digitalorigin.com/
Price	$263 (requires Digital Origin 1394 card)
In short	This would be a professional package at a consumer price, except for the lack of available tracks.

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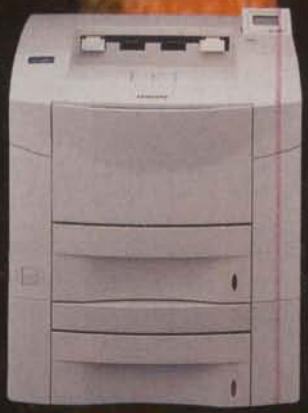
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Presto VideoWorks (consumer)

A lot of work has been done to make this product fast and friendly. As well as capturing video, you can capture stills from videotape, a scanner or digital camera. You can even capture single frames from tape at specified intervals — instant time-lapse movies — but you can't freeze still frames from an existing clip. You can reverse a clip or change its speed, and there's an array of special effects, including chroma key.

VideoWorks has a user-definable menu — the Command Board — for executing frequently used functions. A menu item called Video Fun allows you to add snazzy prefabricated (and configurable) masks and decorations to your movie, or create special applications such as video greeting cards. You can then email the resulting movie directly from the program.

This is a very different product, with an unusual interface. From the bin, you place a clip into the work area where you can view each clip as a mini-timeline. You then add new clips, with effects and so on. This 'master' clip then grows into your movie. Be warned — editing is destructive; changes are written to the actual source file. Make sure you immediately do a Save As on the clip you start with, and give it a new filename. This file is a full video, not a project 'reference' file, and it keeps growing as you add scenes. The PDF manual is excellent in most respects, but doesn't explicitly warn you of these peculiarities.

Transitions, effects and audio are immediately rendered to this clip/timeline, changing the file permanently. Although you have a configurable number of undo levels and you can revert to the last saved version of the movie, that's a far cry from having a true timeline/project file, where random changes are possible before or after rendering. Once a transition or effect has been placed and you've continued with more edits, you can't replace it with a different one unless you undo everything you've done in between.

The same all-or-nothing approach is taken with audio. You can insert a sound clip into the soundtrack, either replacing or mixing it with existing sound. You can also



fade sound in or out by selecting the frames and clicking a menu item — it's fast, but the mix may not give you the levels you want.

Platform	Windows
Contact	Electronic Accessories Australia
Phone	(07) 5593 4442
Online	http://www.newsoftinc.com/
Price	$99
In short	Fun, quirky and good value, but inflexible.

Strata VideoShop 4.5 (professional)

The first thing that strikes you about VideoShop is the immediacy of effects. Some effects, such as picture-in-picture, are visible in the timeline even before rendering. However, when there are several tracks the replay becomes choppy and you need to create a preview file.

VideoShop has features *APC* hasn't seen elsewhere, such as morphing and TuneBuilder. The latter is a remarkable concept that allows you to construct music to fit the timing of your video. Any editor who's had to work with canned production music knows how useful inexpensive, custom-built music is. (You do need QuickTime Pro to use this feature.)



Most filters are 'tweenable'. Tweening is borrowed from animation and is closely related to keyframing. It means you can specify the beginning and end states of an effect, and the computer will fill in all the frames between. True keyframing allows you to set any number of stages in between; thus, tweening is less powerful. For example, tweening allows you to fly a window from one point on the screen to another. Keyframing lets you move it into several different positions, changing size, colour, spin and so on, each time.

There was some trouble with the titler. Titles can move in and out or hold still. *APC* tried moving (or fading) a title onto the screen, holding it for a few seconds, then moving it out. This is common practice in video production, but it required three separate operations (involving a copy and two pastes of the title): one for moving on, one for holding and one for moving off. The copied versions of the title didn't retain drop-shadow settings, so these had to be set three times. To make matters worse, the text couldn't be centre-aligned when moving the title to or from the right or left of screen. It was also difficult to keep the text moving to and from the same points on the screen in the three segments.

In the timeline, the audio tracks show the waveform and have rubber bands in separate strips underneath. This is ideal in theory, but the rubber band strips are very narrow, making it difficult to set levels with any precision. Furthermore, the handles were somewhat recalcitrant and didn't want to be dragged. Clicking higher or lower was sometimes the only way to move them.

Help is available from Strata in the US via email; it was prompt, but didn't address most of our problems.

Platform	Macintosh
Contact	Australian Design & Drafting
Phone	(02) 9460 4099
Online	http://www.strata.com/
Price	$499
In short	Some excellent features, but a few serious operational problems.

Ulead MediaStudio Pro 6.0 (professional)

This is a very impressive package aimed at the mid-range professional market. The video editor comes with a sophisticated titler, an audio editor and a rotoscoping program to draw animations directly onto video. MediaStudio offers batch capture and editing in MPEG-1 and MPEG-2, DV or AVI, and supports MP3 audio input. Other formats are supported.

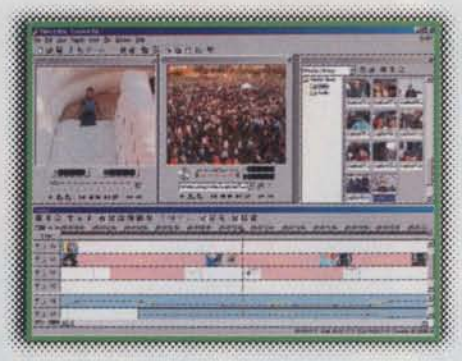
In the editor, you can size everything to your preference. The Source and Preview monitors can be resized substantially without losing functionality, so you can make the timeline any size you like. You can easily have nine tracks visible at once, and tracks can be set individually to different heights. You can save screen arrangements as Layout Templates, easily insert or delete clips, using a full range of ripple edit options to control the rest of the timeline, and control all effects by keyframes.

The product also includes several workflow enhancements. The Production Library is a single window where you organise clips, transitions, effects and so on. It means you have to keep switching between, say, clips one moment and transitions the next, but it's a brilliant space and time saver because you don't have to move windows around.

However, not every feature saves time. Preview files automatically render when you make any change that requires rendering (including audio) and want to play anything. You can turn this feature off by selecting 'Quick Play' in the Preview Monitor. This means you can only view the raw timeline material, not previously rendered effects.

SmartRender is Ulead's version of intelligent rendering, and it works well. However, if the timeline moves due to insertion or deletion, the render is lost and has to be redone. The Smart Relink feature can rebuild a project even if the original files have been moved. Most packages are intolerant of files being moved, and whole projects can be destroyed, so this is a clever feature.

Normally, trimming a clip merely hides trimmed-off sections, excluding them from the timeline. They are still there, however,



and can be retrieved. They also take up disk space. Smart Trim erases the trimmed sections, and recovers their space. This space can be substantial, because you often capture much more than you end up using.

Platform	Windows
Contact	Lako Vision
Phone	(03) 9852-7444
Online	http://www.ulead.com/
Price	$799
In short	Loads of features, and tempting ancillary programs.

Ulead Video Studio 4.0 (consumer)

This is actually two products in one. The first — Video Wizard — is about as basic as you can get, and extremely easy to use. It takes a numbered, step-by-step approach, which allows you to capture video clips, arrange their order, and apply a transition between shots (the same transition between every shot in the movie!). For more flexibility, you need to use the main program, Video Studio. Any project saved in Wizard can be loaded into the main program, making it easy to assemble a movie. You can then graduate to the fancier stuff.



The main program looks like a handheld game machine, no doubt to enhance its friendliness. However, this interface takes up a lot of the screen, and it sits on a blank background, leaving less space for work. The scene bin is very small, and shows only a few tiny thumbnails. A lot of scrolling is required to find what you want in a project of any size. For this reason, the timeline is also a little difficult to decipher and manipulate. *APC* used a 19in monitor for testing. With a standard 15in, it would be even more difficult.

However, the timeline can be switched between 'storyboard' and 'film' modes. Storyboard shows you each clip as a decent-sized still picture of the first frame in the clip, without representing its duration in any way, and icons between clips for transitions. This allows you to clearly see the order of the shots and the flow of the program. To trim shots in the timeline, you use film mode; this is where the lack of space takes its toll.

Video Studio lets you record commentary directly to disk, removing the need to capture it off tape. This saves time and lets you easily synchronise your commentary to the final program with minimal editing. For background music, the program features direct digital transfer of audio CD tracks to WAV files. This preserves quality, and cuts out the conversions between digital and analog that occur if you record from a CD by connecting it to the line in on your soundcard.

As with most consumer packages, audio levels and mixing are not done with rubber bands. You can fade in and out, or set the level of an entire track with spinner-type controls, but truly flexible mixing is not something you'll find in consumer programs.

Platform	Windows
Contact	Lako Vision
Phone	(03) 9852 7444
Online	http://www.ulead.com/
Price	$199
In short	Competent and well organised, but screen space could be used more efficiently.

NO LIMITS

Satisfy your need for speed

Everywhere you turn, ISPs are merging, folding and being bought out. As there is now more competition than ever before, it's crucial to make the right choice. *APC* tests ISP connections and presents you with a guide to seeking bargains and avoiding rip-offs.

Broadband Internet access is fast and mostly reliable, provided you have access to a broadband service (see *APC*'s special report on page 30). You must, however, live in a freestanding house, or be willing to put up with slower download speeds, depending on your broadband provider. Even the most optimistic figures don't see broadband access reaching 20% of the population. The answer for the rest of us for the foreseeable future is dialup access. *APC* went to the modem tracks again, looking for a likely ISP to back. Who failed at the stalls, and who made it to the finish line?

Keeps on getting better

If the ISP industry's PR people are to be believed, we should all have permanent 1Gbps connections for 8 cents a day by now. Clearly, that hasn't happened, but there are improvements — depending on where you live. If you're a city-dweller, the last six months have seen new ISP deals and cheaper rates. If you're a rural Internet user, however, the competition is a little thin.

Some of the bigger established players have made the effort to provide a rural Internet service, but they're still not comparable with urban services. Rural connections are a challenge that few ISPs seem keen to take on — low-quality lines and the problem of providing local call access are widening the gulf between urban and rural access. Technologies such as satellite Net access and the efforts of pay TV provider Austar are a start, but it is unlikely that ISPs will provide full cable modem speeds to remote Australia in the near future.

Merger mania

Until recently, when an ISP dropped off the radar it was because it had gone out of business. Now, an ISP is more likely to have disappeared because a competing ISP now owns it. In the past few months, Telstra attempted to buy OzEmail, only to be chastened by the Australian Competition and Consumer Commission and then beaten by eisa.

Not all the acquisitions are so dramatic: dingo blue is an Optus subsidiary; Pacific Internet owns Zip World (recently renamed Pacific Internet Corporate); and ConnectNet, a subsidiary company of AAPT, resells its capacity to a number of smaller ISPs. Smaller ISPs tend to concentrate on customer service, and our annual ISP Service & Reliability survey results show that subscribers to the larger ISPs are often unhappy with customer service (see *APC* November 1999, page 124).

Unlimited?

ISP pricing has dropped over time. Following AOL's 1998 launch, several top-tier ISPs briefly flirted with genuinely unlimited packages. However, as soon as AOL introduced its limited service, unlimited packages became limited in a variety of ways. Some ISPs provide a huge number of hours, and others offer unlimited hours with a download limit. Your choice is largely determined by your usage patterns: if you download movie trailers all day, you'll use 200M without blinking, but if all you want is a steady flow of text messages, the limited megabyte option may be for you. Then there's always the pay-per-hour model. This is great for email checking, but not for ICQ or online gaming.

ISP phone home?

A bundling mentality seems to be emerging among ISPs. Several of the ISPs reviewed had better rates for customers of their phone services. TPG has an offer for satellite access that throws in a handful of pay TV channels. Telstra is yet to embrace the bundling mentality; it's unclear whether this is because it thinks it already has enough business in its separate arms, or because its Big Pond arm doesn't know what its mobile phone arm is doing.

How we tested

The ISP tests were carried out in *APC* Labs using a PC with a 466MHz Intel Celeron processor, 64M of RAM and a 10G hard disk drive, running Windows 98. To qualify for the review, ISPs needed to have 56K POPs in at least Melbourne, Sydney, and Brisbane. As *APC* Labs is located in Sydney, we dialled into the Sydney POP of each ISP.

In order to reliably and constantly test the ISPs, we ran 100 sets of tests between February 4 and February 18, 2000, using the Ping Central application developed by *APC* Labs. The application cycles through a series of ping, FTP and Web page download tests in order to determine the quality of an ISP's service.

A NetComm Roadster II V.90 modem was used to dial into all the connections, except for AOL and CompuServe Pacific. It was not possible to connect at V.90 speeds to these ISPs using the NetComm modem because of compatibility problems, so we used a 3Com Message Modem connected to the same phone line.

The tests

In order to measure an ISP's performance, both within Australia and overseas, ping tests were run on three Australian sites (ABC Online, Telstra and Optus) and three US sites (MCI, Sprint and AT&T). These sites were chosen because they are either major carriers or major sites within their respective countries.

For the FTP tests, we transferred a 229K file (ERW09B.ZIP) from the Simtel.Net FTP server in the US (ftp://ftp.simtel.net/) and a popular Australian mirror (ftp://ftp.aarnet.edu.au/).

For the Web page (HTTP) tests, we transferred a 95K Web page including pictures and graphics from a popular US site (http://www.geocities.com/) and locally from an Australian university site.

The results

Connect speed shows an average of the connect speeds reported by the modem for all successful connects.

Failed connects shows the number of times the modem failed to connect. This most likely means the ISP was engaged, although failed modem handshaking or user authentication may also cause a failed connection.

HTTP speed measures how fast each ISP downloaded a Web page and related graphics; this required the downloading of multiple files simultaneously.

FTP speed measures how fast each ISP retrieved the test file from the US FTP site and the Australian FTP site. This reflects how well an ISP copes with a single sustained transfer. This is a useful figure for those mainly interested in using the Net for downloads.

Failed FTP retrievals reflects the reliability of the ISP's service, measuring the number of FTP transfers that failed to complete because of timeouts and lost packets. FTP failures can also be caused by server rejections.

Ping time is a measure, in milliseconds, of how fast the ISP's service is to the respective US and Australian sites. A fast response time means the ISP was able to deliver data quickly; a slow response time is often indicative of a poor or busy link. People interested in game playing and other lag-sensitive activities should take particular note.

Ping packet loss is an overall reflection, expressed as a percentage, of how congested an ISP's link is to the respective US and Australian sites. A low value here means an ISP consistently provided a reliable link, whereas a high value reflects problems such as pauses and timeouts experienced while accessing the Internet.

Josh Mehlman and Alex Kidman

AAPT Smartchat Internet

AAPT Smartchat did reasonably well in most tests, or at least in those tests it was able to complete. For some reason, it refused to cooperate with the Web component of *APC*'s testing software, and so achieved no Web download results whatsoever. This doesn't mean you would have trouble viewing Web pages, just that we could not give it a rating. It also had a high number of failed connects: 10 in all, placing it third last.

In a packed field of candidates, AAPT Smartchat's average connection speeds were only 1.2Kbps off the top speed, at a healthy 47.1Kbps. Ping times were quick, achieving sixth and fourth placing for US and local ping times respectively, although losses (especially local losses) of ping packets were a little high. Mirroring the trend of good basic results with disappointing follow-up results, its FTP speeds were good — it was second fastest in our US FTP tests — but FTP failure rates were bad, (it placed fourth last for both the US and local tests).



Overall, this ISP is just a little too flaky to recommend. When it works, it works really well, but when it doesn't, it bombs.

AAPT's plans are adequate: you pay 2 cents a minute up to a capped fee of $34.95, with a minimum monthly fee of $9.95 on its Smartsurf Maxi plan.

Australian ISPs are closing ranks, and the bigger and faster companies are literally gobbling up the slower competitors, either by buying them out or through customer churn. AAPT needs to pick up its game.

Alex Kidman

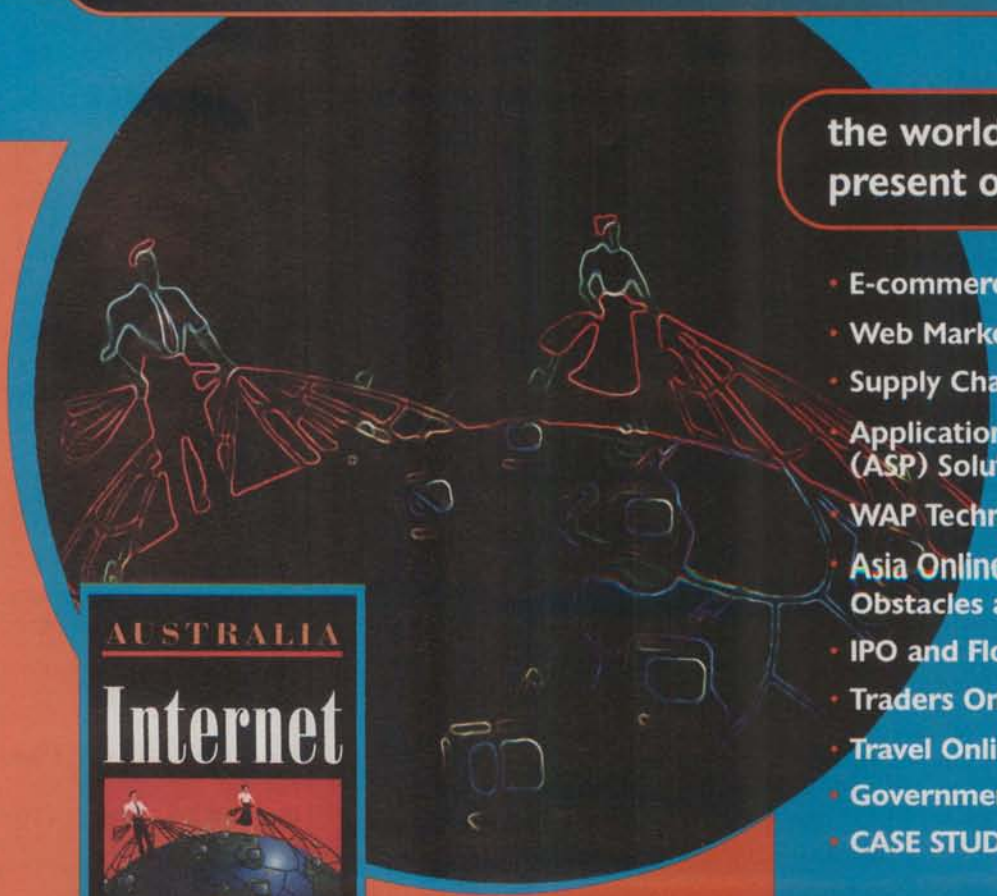
Phone	1300 651 414
Online	http://www.smartchat.net.au/
In short	Good pricing, poor reliability.

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AOL

AOL is family-focused and easy to use, which makes it a good choice for first-time Net users who are hesitant to dive in headfirst.

The big criticisms of AOL after it was launched in Australia in 1998 were that its pricing plans did not cater for heavy use, and unlike its US parent, it didn't have an unlimited access plan. It took almost two years, but AOL finally announced two new plans: AOL Family, providing 20 hours a month for $34.95 and AOL Super, providing 150 hours a month for $49.95. Although these plans are not cheap, they're not much more expensive than comparable Telstra Big Pond or OzEmail plans.



AOL attempts to differentiate itself from other ISPs by offering additional services such as parental controls to limit children's access to unsuitable content, and exclusive content such as financial and legal advice. However, it seems AOL hasn't been trying very hard lately. Recent additions range from the tacky — an Australian Aboriginal area where you can buy Aboriginal books, art and crafts — to the unoriginal, such as the Australian Open and the Sydney Gay and Lesbian Mardi Gras, both of which already have ample free information online.

APC's tests showed little change in the quality of AOL's service. Downloads from the Internet are slow but reliable. Australian content is slower than US content, as AOL's network is routed through the US.

Josh Mehlman

Phone	1300 654 633
Online	http://www.aol.com.au/
In short	New access plans for heavy use make it a good family choice.

CompuServe Pacific

In the past, *APC* hasn't had many good things to say about CompuServe Pacific's service, and once again it's near the bottom of the pile with stablemate, AOL. If you're a frequent overseas traveller, then CompuServe Pacific may be the ISP for you, with its global roaming capabilities (185 countries). However, if you're unlikely to travel much, you'll want a more stable and speedier connection.

APC found in past reviews that CompuServe Pacific's strength is in its connection to the US, but it is dismal in Australia. Although the average connection speed has decreased since our last test, ping times and FTP transfers have either improved slightly or stayed stationary. For those thinking of downloading a lot of files from local Web sites, if the slow speed doesn't deter you from CompuServe Pacific, the shocking 79% FTP failure rate should.



The pricing plans have not changed since our last review and are still too expensive for what you get. There are few included hours, and the charges for oversurfing are high. CompuServe has jumped on the instant messaging bandwagon, with a free 'CompuServe Instant Messenger' which is ported from parent company, AOL. The Australian home page is thin on content, but the international site (CompuServe.com) has much more to recommend it.

Darren Ellis

Phone	1300 555 520
Online	http://www.compuserve.com.au/
In short	Too slow and expensive, but could be good for travellers.

ConnectNet

ConnectNet does a lot of business by simply reselling its ISP capacity to resellers, so there's good chance that wherever you happen to be in Australia, the local ISP is reselling ConnectNet to you.

To complicate matters further, ConnectNet is owned by AAPT, which runs its own consumer ISP service using the same network, reviewed on page 107. Last time *APC* looked at ConnectNet, its results were exceptional. This time it appears its connections are busier, because results were still good, but not exceptional. ConnectNet really impressed *APC* last time around with its 100% connection rate, but it failed six times in these tests. This isn't a dreadful result, but it is still the sixth-highest failure rate. Its overseas connections were more solid than its local ones — it managed the second-highest US ping times, but was only average on local sites.



ConnectNet had an worrying tendency to drop ping packets, both locally and internationally, which isn't good news for gamers. Its Web speeds were good (an average of 4.2Kbps for both local and international sites), which is consistent with previous results. FTP speeds were good, but like many other fast FTP ISPs, failures were also common — ConnectNet was the worst of the bunch with a 13.8% failure rate when it came to US FTP.

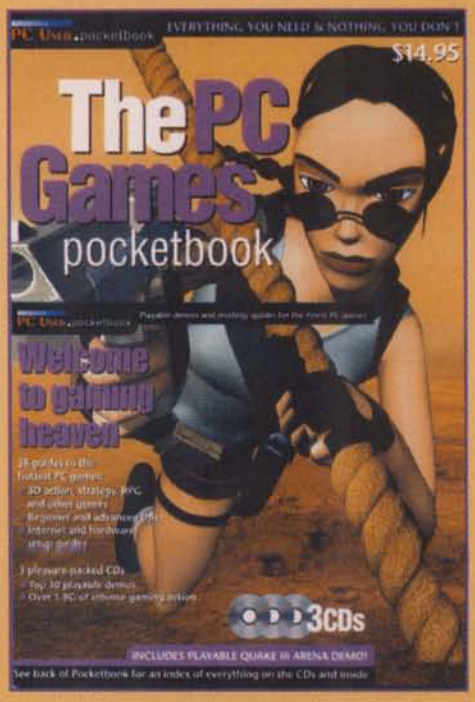
ConnectNet's pricing is average, and most of its plans cost about $3.50 an hour and less for off-peak use.

Alex Kidman

Phone	1800 818 262
Online	http://www.connect.com.au/
In short	Its slowness makes its high prices less attractive.

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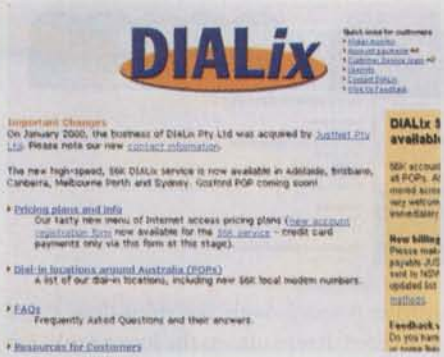
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DIALix

Those readers who regularly follow *APC*'s ISP reviews may remember that last year, DIALix decided to operate its Melbourne and Sydney services under the banner of JustNet. The folks at JustNet/DIALix have decided that DIALix is a perfectly good name after all, and they're going to stick with it.

One of the veterans of Australia's ISP scene, DIALix is still hanging on to a few outdated practices. It charges a $29.95 setup fee for all new accounts. *APC* understands that setup fees are a disincentive to customers switching ISPs, but $30 is excessive. DIALix also charges $2 a minute for customer support (except for initial setup and billing inquiries),



which is not acceptable in a highly competitive ISP market.

DIALix's pricing plans are reasonably good for heavy users; the $24.95/80-hour Economy plan strikes an appealing balance between medium and heavy use. The $40-a-month Ultra plan allows 220 hours access, which is great for eight-hour-a-day Net junkies.

DIALix's ping times weren't the best, but the FTP tests showed that connection was reasonably fast and stable. File transfers from the US were relatively speedy and reliable and although the locally downloaded files weren't as fast, they almost always made it through.

Josh Mehlman

Phone	1800 767 057
Online	http://www.dialix.com.au/
In short	Good plans for heavy users.

dingo blue

There is an interesting marketing strategy behind dingo blue. It's basically a front for Optus, and it projects a slightly different image to that of the parent company. Although dingo blue shares a lot of resources with Optus Internet, it has significantly different policies to its parent.

For a start, dingo blue doesn't provide any services for casual users. It has two pricing plans: one for its long-distance phone call customers and one for everyone else, and both are on the extra beefy side. The Go Roving plan provides unlimited access for $45 a month, comparable to OzEmail OzE200 and Telstra's Big150 plans. If you use dingo blue for your long-distance calls, the More Bite for your Buck plan offers the



same unlimited access for only $25 a month, which is an attractive option.

It's wise, however, to be suspicious of an offer that looks too good, and normally unlimited access plans at very low prices mean less than impressive performance. However, dingo blue really shone on the Australian side of things, and overseas connections weren't bad either. Its transfer speeds were fast for Australian Web pages and FTP files, but a little slow for files from the US. Its connection wasn't entirely reliable; about one in every 20 files did not complete its transfer. *APC's* test system failed to connect seven times out of the 100 attempts, which is a fairly poor result.

Josh Mehlman

Phone	1300 551 455
Online	http://www.dingoblue.com.au/
In short	Definitely one for heavy Internet users to consider.

Hotkey

Franchise ISP Hotkey had blossomed into a decent provider at the time of *APC*'s last review, and its performance has not changed much in the past six months. The average speeds (FTP and HTTP) to the US and local sites are slightly slower, but the biggest change is in the overall connection quality.

The ping and FTP test results reflect a more reliable service this time around. Local ping response times have slipped a bit, but for US connections they improved considerably. The ping packet loss for both local and US connections has decreased dramatically: 0.5% for Australian sites, and 3.4% for US sites. This is a far cry from the 15.5% US loss recorded last time.



Six months ago, *APC* observed that Hotkey's pricing plans were a mix of poor to good. Since then, it has marginally increased the hours included with monthly access plans, and has cut out some of the less appealing plans. All plans incur a $25 setup fee, and the new extra hours range from another three for the $22-a-month plan to an extra five for the $42-a-month plan. It's not much, but it is a bonus.

For beginners, the Hotkey Web site includes handy hints and information about the Internet, IRC, Web searching and so on. Hotkey now also includes Zone Studio software to help you create your 5M Web site.

Darren Ellis

Phone	1300 655 366
Online	http://www.hotkey.net.au/
In short	Improved performance and more hours included than six months ago.

ihug

ihug (formerly known as The Internet Group) wasn't included in *APC*'s last round of ISP tests, but this time around its relatively large number of subscribers prompted us to throw it in with the bunch. Like a lot of the other big players, ihug's primary consumer-level product is a flat-fee, all-you-can-eat buffet of ISP services. The question is, can it deliver this for $29.95?

The answer? Partially. ihug's average connect speed of 47.8Kbps was good, and it managed a relatively low 2% failure rate for Australian FTP. Beyond that, the picture was not quite as good, and ihug only managed an average performance. Just under 10% of its US FTP transfers failed, and this



carried through with the third-slowest US FTP speed. It was also in the lower ranks for Australian FTP, although this was a much closer field, where only 1.1Kbps separated the best and worst scores.

Its Web scores were solid but unspectacular, and for some reason its US connectivity was slightly faster than its local access. ihug can't be recommended as a good ISP for gamers because *APC* tests showed it had high ping packet loss and slow ping times.

At $29.95, ihug is awfully cheap. However, it's a matter of getting what you pay for. For $29.95, ihug is hard to overlook, if blazing performance isn't a priority.

Alex Kidman

Phone	(02) 9324 1500
Online	http://www.ihug.com.au/
In short	ihug is cheap, so it's worth considering if you don't need speed.

Lexicon Internet Services

This is Melbourne-based Lexicon Internet Services' first appearance in our biannual ISP reviews, and it rates highly. Lexicon claims to use a 'unique routing structure', involving a mix of satellite and wired backbones. To increase connection speed, Lexicon routes data that is lag-sensitive (gaming, videoconferencing and so on) over the wires, and routes data for activities such as general surfing and FTP transfers over the satellite links. So how does this affect surfing?

Quite positively, according to *APC*'s test results. It failed to connect 17 times (equal last with Netspace), but when we did link up, the average connection speed was a smidgen short of being the fastest.



Lexicon also scored fast ping times to local and US sites, and had minimal losses from both.

The HTTP times were the fastest for Australian sites, and second fastest for US sites. FTP times were also high: the failure rate was zero for local downloads, and it had the second-lowest failure rate of 3.6% for US downloads.

The pricing plans are very palatable, ranging from a $9.95 monthly plan that includes six hours to a $39.90 a month plan with a 300M download limit (if not fully used, the remainder is carried over to the next month for a maximum of two months). Each pricing plan comes with 50M of Web space. Yes, that's 50M, not the standard 5M.

Darren Ellis

Phone	1300 369 030
Online	http://www.lexicon.net/
In short	Fast, reliable and well priced.

Netspace

Netspace has been a solid contender in past *APC* ISP reviews, let down only by one or two factors. Last time, it had great performance, marred only by a horrible ping loss when connecting to Telstra. Someone at Netspace must be listening, because ping times have improved, along with just about every other factor.

Connection speeds were a very healthy average of 48.2Kbps (only 0.1Kbps off the leader), local ping times were fast, and ping packet losses were average at worst. Web speed was good, and Netspace achieved the second-best speeds for local and international access. FTP download speeds were average, but Netspace managed the rare achievement of having no



Australian FTP failures, and the second-best rate of international FTP fails. All this points to solid and fast performance. However, there's still one problem: a whopping 17 failed connections. It's a fast, reliable and sturdy service, once you get through.

Netspace's access plans are very reasonably priced, and the most you will pay for access is about $1 an hour. You can also prepay for the year and receive further discounts.

Netspace has come very, very close to claiming the Editor's Choice prize nearly every time *APC* has reviwed it in the past. If it were not for the failed connections that got in the way, it would probably be there now.

Alex Kidman

Phone	1300 360 025
Online	http://www.netspace.net.au/
In short	Great performance and price. Poor connectivity.

One.Net

Since the launch of the telco One.Tel and its associated ISP One.Net, their services have failed to live up to the associated hype. Although service had improved markedly at the time of *APC*'s last review six months ago, *APC* tests results for this roundup show that One.Net's service has slipped again. *APC*'s last tests showed an improvement in speed, stability and transfers, but this time the results have almost dropped back to their previous low levels.

Failed connections have increased to six, and the overall connection speed has dropped. HTTP, FTP and ping times to the US and Australia reflected this slight drop in speed, but more telling are the higher



rates of ping packet loss: from a marginal 3% to 4% to more than 10% for Australian and US sites. This is a serious drop in reliability. *APC* also experienced FTP failures of about 10% for local and international transfers, which is too high for comfort.

One area where One.Net has done well is in its pricing plans. These include the popular 2.1 cents a minute (or $1.36 an hour) plan — ideal for emailers, but not so good for general surfing — up to the unlimited hours/$24.95 plan, which has a 300M download limit.

(*APC's* parent company Publishing and Broadcasting Ltd is a shareholder in One.Net.)

Darren Ellis

Phone	1300 303 312
Online	http://www.one.net.au/
In short	Attractive pricing, but service has deteriorated since *APC's* last review.

Optus Internet

Optus Internet's results in the last round of ISP testing were poor. In its defence, Optus claimed it was in the process of revamping its network. This is a line *APC* has heard many times in the past, but in this case it appears to have been true.

Optus Internet was one of five ISPs *APC*'s test machine managed to connect to every time without a hitch. Its ping times were average, but its ping losses were minimal. Optus' download speeds were better from Australian sites than overseas, earning it fourth place in the Australian Web page download test and first place in the local FTP download test. Its speed to US sites was average, but its downloads were very reliable.



As well as revamping its network, Optus has significantly overhauled its pricing plans. The $20-a-month Browser plan remains the same, but Optus now offers Surfer (30 hours a month for $30) and NetMaster (200 hours a month for $45). Both plans are very competitive, considering Optus' good performance.

The yes@work plan is an attractive option if you're considering getting your office connected. For $24.95 a month, you get unlimited access between 6am and 6pm, Monday to Saturday, and $2 an hour at other times. OK, it's a good option as long as you never work late.

Josh Mehlman

Phone	1300 301 325
Online	http://www.optusnet.com.au/
In short	Optus has shown a great improvement in pricing and performance in the last six months.

Orange

Orange seems to want to sell its ISP service only to its mobile phone customers. When you go to the Orange Web site, and once you get past the octopus logo, you have to go down a few levels to find any details about its Internet service.

APC has previously seen average results from Orange, and there was little change this time. Orange managed the lowest average connection speed at 44.3Kbps, although this was in a close field. Impressively, Orange had only one failed connect. These results make the total Orange picture one of slower connections, but with a modem pool which is easy to access.

Ping times were neither slow nor fast, but the US ping losses were too high. Web



speeds were good, especially in the greatly disparate US Web tests. FTP was a mixed bag; its local connection speed was good, just nipping at the heels of the best scores, but its US speed was equal last, nearly a full point below the leader. Failures in FTP were low.

Orange's pricing plans are based on a payment of about $2 an hour, but there are cost savings if you are an Orange mobile customer.

Orange's performance and prices aren't good enough to put it in the top tier of local ISPs. Until they improve, it will remain fairly average.

Alex Kidman

Phone	13 31 78
Online	http://www.orange.net.au/
In short	Althought tempting for Orange's mobile customers, other people could probably do better.

OzEmail Internet

As usual with the ISP reviews, *APC* tested two OzEmail Internet accounts because they have different modem lines. The first is the general account that uses the normal dialup connections, and the second is the OzE200 account, which has limited user numbers to ensure a better and faster connection. OzE200 costs $44.90 a month and includes 200 hours (about 6.5 hours a day in a 31-day month). Other pricing plans include the OzEstart ($9.95 a month with three hours) for beginners and the OzEdollar account ($39.95 a month for 40 hours).

As *APC* found in OzEmail's last review, there are differences between the two connections we tested, but they are not nearly as obvious as you would expect.



Both accounts had similar ping results; compared to the last review, the times to local sites slowed down and more packets were lost, but US times were faster and had a mix of better and worse packet losses. These results were replicated in the HTTP tests: a slower Australian response and a mix for the US sites. For both accounts, the FTP transfer times were down slightly on the last test, with FTP failure rates of 3% to 4% for Australia and 8% for the US.

Both accounts have good speeds and are reliable. The OzE200 account's only advantage is the larger number of free hours a month for a lower fee. The account is not available from all of OzEmail's POPs, so check before signing up.

Darren Ellis

Phone	13 28 84
Online	http://www.ozemail.com.au/
In short	A reliable provider with attractive pricing.

Pacific Internet

Pacific Internet is a relatively new entrant in the Australian ISP market, formed when its Singaporean parent company acquired Sydney's Zip World and Melbourne's Mira Networking, and it didn't fare too well in *APC*'s last review. Although Zip World largely operated independently, Pacific provided its service over Mira's infrastructure. Pacific's performance has declined in comparison to *APC*'s previous test of Mira. It had high ping loss and many failed FTP transfer attempts, but its pricing plans were good. Pacific Internet seemed to be the only ISP where a 'no busy signal' policy actually rang true. *APC* had no failed connections.

This time, there have been a few performance changes, some for the better, some



for the worse. HTTP times have changed little: they are faster for local sites and slower for US sites. FTP speeds have slowed in both tests. This change was reflected in the ping results, where Australian and US times are slower than before. On the upside, the packet losses have dropped dramatically to under 0.5% for Australian sites and 3.4% for the US, so although speed has dropped slightly, quality has increased.

Pacific Internet has attractive plans, which offer better value for money the higher you go. There are the Easy and Easy Access plans ($2.95 for two hours, $9.95 for eight hours) up to the Easy Unlimited plan, which has a 250M limit for $29.95 a month. Prepayment in three-month blocks reduces the cost to $74.85.

Darren Ellis

Phone	13 65 35
Online	http://www.pacific.net.au/
In short	Performance has improved, reasonably priced.

Planet Internet

Planet Internet requested to pull out of testing when *APC* Labs was about 85% through, but we continued the tests anyway. The reason Planet Internet gave — one which ISPs frequently give to *APC* during our biannual ISP reviews — was that it was about to undergo 'significant network upgrading'.

Although it didn't blitz any particular category, Planet Internet had little to worry about. Its average connection speed was a solid 48.2Kbps, it had no failed connections, and although its ping times weren't exceptional, they were acceptable. Web speeds were solid, a little faster locally than internationally. Although its FTP speeds weren't much to write home about,



FTP downloads were exceptionally reliable — not a single local failure, and the fourth-best rate for international FTP.

Planet Internet's pricing was reasonable, at about $1 to $2 an hour, and additional hours cost a little more again. The only unlimited option covers the hours between midnight and 8am for $20 a month. TPG provides almost exactly the same service for nothing, somewhat lessening the value of this graveyard shift package.

Planet Internet was a solid performer in *APC* tests. If its upgrades are up to scratch, it could be an ISP player to watch out for in future.

Alex Kidman

Phone	1300 364 345
Online	http://www.planet.net.au/
In short	A solid ISP, providing good performance at a decent price.

Telstra Big Pond Home

As with TPG and OzEmail, *APC* tested two accounts from Telstra Big Pond, the Big Pond Home account and the Big Pond Big150. Like the other two ISPs, the two connections vary, due to the policies in place. To guarantee better connectivity, the Big150 account has certain limitations: it has a five-hour stretch limit, disconnects after 20 minutes of idle time and its POPs are restricted to Adelaide, Brisbane, Canberra, Hobart, Melbourne, Perth and Sydney.

Both accounts returned similar results in *APC*'s tests. Since the last review, the ping results showed a slight slowdown for local sites, and there was a marginal speed increase for US sites. The rate of packet loss



has dropped for the regular account for both local and overseas pings, and worsened slightly for the Big150. The Australian HTTP speeds have improved for both account types, but the US speeds have decreased a little. Although the FTP speeds for overseas and local sites slowed, the regular account never failed in local retrievals (Big150 only failed 2% of the time), and the US fails were at 5% to 6%.

One of the most frequent complaints from Big Pond subscribers is that although it has great service, it is overpriced. This may be true, but Big Pond has recently cut its prices. The Big150 plan now costs $35 and includes 150 hours (and $2.40 an hour thereafter). The general connection plans start at $7.15 for three hours.

Darren Ellis

Phone	1800 804 282
Online	http://www.bigpond.com/
In short	Good service at even more attractive prices.

TPG

Normally, when *APC* has looked at ISPs that have separate dialup lines for an unlimited service and a pay-by-the-hour service, there has been a big difference in performance. This is to be expected, as people on an unlimited account are more likely to stay online, eating up modem resources and lowering the quality of the available service. TPG appears to have reversed this trend, because its unlimited service matched its per-hour service step for step, and outpaced it on several fronts.

TPG's per-hour service recorded the highest average connection speed at 48.3Kbps. Failed connections were low (four for the per-hour line, five for unlimited) and ping times and packet losses



were virtually identical: not superfast, but stable and with average packet losses. Web speeds were average for both accounts. When *APC* tested FTP speeds, things became interesting: speeds for both were almost identical, but the TPG unlimited package managed the lowest US failure rate, leaving the regular TPG account in its dust. The local FTP results were similar, and the unlimited account had no failures.

Part of the reason for the unlimited service's good speed is that TPG charges a per-megabyte rate once you hit the ceiling of the account, in this case 300M. Once you blow that, you pay 20 cents a megabyte, so hard-core users should be wary. However, if you can duck under that amount, it's worth considering.

Alex Kidman

Phone	(02) 9850 0888
Online	http://www.tpg.com.au/
In short	Good and fast, as long as your downloads remain low.

Zip World/Pacific Internet Corporate

Zip World was going from strength to strength in our testing — each time, its performance has been good, and this time around it has worked its way up into the upper echelon of ISPs. Zip World was bought out last year by Singapore-based ISP Pacific Internet, and initially there were few changes, apart from customers being able to choose between Pacific and Zip World pricing plans. Pacific has now decided to dump the Zip World brand and focus that modem pool on business use.

Businesses demand speed, and *APC* test results show it can deliver. It had no failed connections and no failed FTP transfers from the Australian site. Its Web page download speed was very fast and its FTP



download speed was just off the pace. Transfers from US sites were fast and reliable.

The big change at Pacific Internet Corporate not just in the name. It has also elected to put 'Business' in all its plan names. The Business Budget plan has 40 hours a month for $29.95, and the High Usage Business plan nets 150 hours for $39.95. The new addition is the Easy Access Business plan, similar to Optus Internet's yes@work plan. For $29.95 a month, BusinessOne gives you 360 hours of access, as long as you use them between 6am and 6pm (access costs $2.50 an hour at any other time). *This plan is significantly more* expensive than Optus' plan, and doesn't offer much more in return.

Josh Mehlman and Alex Kidman

Phone	1300 555 074
Online	http://www.zipworld.com.au/
In short	Very good performance, some pricing a bit steep.

Editor's Choice



Telstra Big Pond Home

Highly commended

Netspace

It should come as no surprise that Telstra Big Pond tested well; after all, if you own the network, you'll probably get the best access. In this round of reviews, it was interesting how close the field was for a large number of ISPs: Netspace did very well, inching out such rivals as Lexicon Internet Services and Optus. A solid service from Netspace pushed it ahead, but it fell badly behind Telstra as a result of its large number of failed connects. Zip World was also in the running for Editor's Choice, but took themselves out of the running with the change to an all-business model. Telstra performed well across a whole range of tests, whereas other ISPs did well in some tests but failed in others. The ISP market is becoming very competitive, and there is only a fine line between the top ISPs.

Internet service withholders

There were several ISPs that didn't make it into this round of reviews. Usually when an ISP drops out of *APC*'s review line-up, it's because it has ceased operations. This time, the reason was far simpler: not answering the phone, fax or email. AT&T Business Internet Services and eisa both failed to respond to *APC*'s multiple requests for testing accounts. Presumably, eisa was too busy acquiring OzEmail to respond.

Internet Access Australia declined to participate in testing, as it has been purchased by Asia Online and was moving all its access points to Asia Online's access nodes during the testing period.

Microplex has been fully absorbed into Optus Internet, and is no longer accepting new customers. Therefore, *APC* tested Optus Internet but not Microplex.

AAPT Smartchat Internet

Smartsurf 2.5		**None**
None	Unlimited	None
20M	Unlimited	None

* 2.5c a minute charge, no max or minimum.

Smartsurf 2.0		**$35**
None	29	$1.20
20M	Unlimited	None
Smartsurf Maxi		**$9.95 to $34.95**
None	Unlimited	None
20M	300M	25c

* 2c a minute, max capped fee of $34.95

AOL

AOL Now		**$9.95**
None	3	$4
14M	Unlimited	None
AOL Classic		**$19.95**
None	8	$4
14M	Unlimited	None
AOL Family		**$34.95**
None	20	$4
14M	Unlimited	None
AOL Super		**$49.95**
None	150	$3.50
14M	Unlimited	None

CompuServe Pacific

Standard		**$14.50**
None	2	$5
5M	Unlimited	None
Super Value		**$35**
None	10	$3.50
5M	Unlimited	None
Power		**$60**
None	25	$3.50
5M	Unlimited	None
Business		**$99**
None	40	$3.50
5M	Unlimited	None

ConnectNet

Plan 10		**$10**
$7.95	3	$3.50*
20M	Unlimited	None
Plan 20		**$20**
$7.95	8	$3.50*
20M	Unlimited	None
Plan 30		**$30**
$7.95	14	$3.50*
20M	Unlimited	None
Plan 40		**$40**
$7.95	21	$3.50*
20M	Unlimited	None
Plan 50		**$50**
$7.95	30	$3.50*
20M	Unlimited	None
Plan 70		**$70**
$7.95	45	$3.50*
20M	Unlimited	None

* $1.75 off-peak (midnight to 7am). More plans available

DIALix

Lite		**$2**
$29.95	1	$1.80
1M	Unlimited	None
Economy		**$24.95**
$29.95	80	$1.80
3M	Unlimited	None
Ultra		**$40.00**
$29.95	220	60c
5M	Unlimited	None

dingo blue

Leader of the Pack*		**$25**
None	Unlimited	None
5M	Unlimited	None
More Bite for your Buck**		**$25**
None	Unlimited	None
5M	Unlimited	None
Go Roving		**$45**
None	Unlimited	None
5M	Unlimited	None

* For long-distance and local call customers only
** For long-distance call customers only

Hotkey

Hot 12		**$12**
$25	4	$3
5M	Unlimited	None
Hot 22		**$22**
$25	15	$2
5M	Unlimited	None
Hot 30*		**$30.00**
$25	Unlimited	None
5M	300M	$0.20
Hot 32		**$32**
$25	25	$1.50
5M	Unlimited	None
Hot 39*		**$39**
$25	Unlimited	None
5M	Unlimited	None
Hot 42		**$42**
$25	35	$1
5M	Unlimited	None

* Not available in all areas. Other plans available



ihug

Anytime		**None**
None	Unlimited	$2
10M	Unlimited	None
Bronze		**$10**
$29	15	75c
5M	Unlimited	None
Gold		**$20**
$29	30	75c
5M	Unlimited	None
Sapphire		**$24.95**
$29	60	75c
5M	Unlimited	None
Diamond*		**$29.95**
$29	Unlimited	None
10M	Unlimited	None

* Can be prepaid in three-month blocks for a $5 a month discount

Lexicon Internet Services

Access 6+		**$9.95**
$20	6*	$2.20
50M	Unlimited	None
Access 15+		**$19.95**
$20	15*	$1.50
50M	Unlimited	None
Access 30+		**$34.95**
$20	30*	$1.50
50M	Unlimited	None
Access 60+		**$44.95**
$20	60*	$1.50
50M	Unlimited	None
Unlimited 150+		**$29.95**
$20	Unlimited	None
50M	150M**	25c
Unlimited 300+		**$39.95**
$20	Unlimited	None
50M	300M**	25c

* Unused hours are carried over to the next month, up to a limit

** Unused megabytes are carried over to the next month, up to a limit

One.Net

Pocket Money		**None**
$19.95	Unlimited	$1.95
None	Unlimited	None
Unlimited Plan		**$24.95**
None	Unlimited	None
10M	300M	25c
Life in the fast lane		**$29.95**
$19.95	56	$1.95
3M	Unlimited	None
Wipe Out		**$39.95**
$19.95	150	$1.95
3M	150M	25c
Big Kahuna		**$49.95**
$19.95	250	$1.95
3M	250M	25c
2.1c		**None**
None	Unlimited	2.1c a min*
3M	Unlimited	None

* Billed in one-minute increments

Key to ISP pricing plans

Plan name		**Monthly fee**
Setup fee	Hours a month	Cost of extra hours
Web space provided	Download limit a month	Cost of extra downloads

Free at last?

'Free' Internet access has been reasonably common overseas for some time, especially in countries with timed local calls. The UK is a good example; it's possible to wander into your local chemist, pick up some preparation H and an ISP kit. In Australia, the move to free access has been slower, mainly because local calls aren't timed. There are a few players in the free ISP market. Quite a few of them have not even launched yet, but they're all investing heavily in advertising. Free ISPs make their money through advertising, either by forcing a permanent advertising banner to appear on your PC, by restricting your Net access in order to 'push' you towards sites that they collect revenue from, or by selling whatever information you give them to third parties. The last option seems to be the best bet for anyone looking to set up a free ISP; a recent Forrester Research report suggested that the advertising-driven free ISP market will be swamped by information onsellers within a couple of years (see http://newswire.com.au/9909/ispfree.htm).

For some Net users, such free services may be ideal. If you can put up with the ad banners and the fact that most support only Web-based access — meaning no direct email, FTP or IRC — then you could give them a try. As the rest of the industry is making moves towards conglomeration, it's interesting to see that this is an area where new startups frequently appear, much as new ISPs did a few years ago. Even Telstra has admitted it sees the growth of free ISPs as a threat to its business model.

APC considered testing free ISPs, but at the time of writing, several 'major' players had either not yet launched, were no longer accepting new members, or were yet to finalise their business models. If the 'free ISP' model does take off in the near future, it will be interesting to watch the market and test the services on offer.

Netspace

Home Casual		**None**
None	Unlimited	$2
10M	Unlimited	None

* This plan has an annual $25 fee

Home 20		**$20**
$25	20	$2
10M	Unlimited	None

* This plan can be prepaid for $170 a year

Home 50		**$35**
$25	50	$2
10M	Unlimited	None

* This plan can be prepaid for $300 a year

Home 100		**$60**
$25	100	$2
10M	Unlimited	None

* This plan can be prepaid for $420 a year

Saver 200		**$45**
$25	200	$2
10M	Unlimited	None

Optus Internet

Browser		**$20**
None	10	$4.50
5M	Unlimited	None
Surfer		**$30**
None	30	$4.00
5M	Unlimited	None
NetMaster		**$45**
None	200	$0.50
5M	Unlimited	None
NetSaver		**$10**
None	4	*
5M	Unlimited	None

* $2 an hour for first 20 hours, then $1 an hour next 20 hours, then free 45 to 200 hours, then 50c an hour thereafter

yes@work		**$24.95***
None	Unlimited**	$2
None	Unlimited	None

* The fee is $19.95 for existing Optus phone or pay TV customers

** Unlimited hours from 6am to 6pm, Monday to Saturday

Something.... UNIQUE, SPECIAL & Reliable

Pc case (250W C-Tick app)



GLOSSY SERIES

Elegant look with glossy finish front panel
Anti rust steel with cut free edge
Sides out panels. ULTRA SLIM Desktop.
Snap on FDD/HDD bracket
Well ventilated design

PHOENIX SERIES



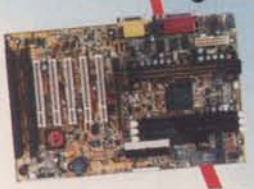
CI-7113 CI-6313 CI-6613 CI-9113

Net PC NLX (LPM) Barebone system



BX chip set all-in-one ATX M/B, slot 1
Builtin VGA, Sound, Lan, USB...
Intel NLX Standard
Dimension (mm): 285x35x85

MICRO STAR Motherboard (Intel, AMD, ATX, MicroATX)



INNOVATION AWARD '99

GameStar Testsieger

MSI

Intel 440BX/810/k7
D-LED (Self Diagnosis)
Trend Anti Virus safe BIOS
PC Alert
STR
CPU Plug & Play
T.O.P. (over heat protection)
Setting in BIOS for overclocking

CD DUPLICATOR EDC-01 (SCSI)



No need for a computer just connect on CD-Rom (source) with CD-R (up to 3) and EDC-01 the press the button, data will be mirrored in 8/6/4 speeds, Very easy and reliable.

4 way HI FI surround Multimedia Speaker





T-REX 2000

4"woofer+3.5" mid+2"tweeter+3"full range
RMS: 50W THD<10% Distortion<1%, sensitivity: 65db
Response: 20HZ-20KHZ, Digital EQ in Rock, Jazz, Pop
Surround Effect music, movie (Optional) Remote control

netPro ALFM-56 MODEM

High speed 56k external series modem
Australia A tick approved
Rockwell voice/fax/modem 14.4S/R
2MB F Rom, V90/K56flex





PC/Server UPS

Output: 600Va, Voltage stabilizer
Voltage surge/spike protection
Intelligent S/W monitoring
Long battery life
Award winning 98/99

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Orange

e-20		**$20**
$25	10	$2.95
3M	Unlimited	None
e-40		**$40**
$25	25	$2.95
3M	Unlimited	None
e-60		**$60**
$25	40	$2.95
3M	Unlimited	None
e-80		**$80**
$25	60	$2.50
3M	Unlimited	None
e-time*		
None		$2
None	Unlimited	None
e-time20*		**$20**
None	12	$2
3M	Unlimited	None

* Available to Orange phone or pager customers only. Other plans available.

OzEmail Internet

OzEstart		**$9.95**
$20	3	$4
5M	Unlimited	None
OzElight		**$19.95**
$20	7	$4
5M	Unlimited	None
OzEclassic		**$24.95**
$20	12	$3.50
5M	Unlimited	None
OzEstrong		**$29.95**
$20	20	$2.50
5M	Unlimited	None
OzEdollar		**$39.95**
$20	40	$1
5M	Unlimited	None
OzE200+*		**$44.95**
$20	200	$3
5M	Unlimited	None

* Limited regional availability



Pacific Internet

Easy		**$2.95**
None	2	$2.95
10M	Unlimited	None
Easy Access		**$9.95**
None	8	$2.95
10M	Unlimited	None
Easy Access Plus		**$19.95**
None	20	$2.95
10M	Unlimited	None
Easy Surfer		**$39.95**
None	180	$2.95
10M	Unlimited	None
Easy Unlimited*		**$29.95**
None	Unlimited	$2.95
10M	250M	$0.25

* Also available as a three-month prepaid plan at $74.85. Other plans available. Seniors Card discount available.

Zip world/Pacific Internet Corporate

Casual Business		**$4.95**
None	5	95c
10M	Unlimited	None
Easy Access Business*		**$29.95**
None	360	$2.95
10M	Unlimited	None
Budget Business		**$29**
None	40	$2.50
10M	Unlimited	None
High Usage Business		**$39**
None	150	$2.95
10M	Unlimited	None
Multi User**		**$49.95**
None	200	95c
10M	Unlimited	None

* Between 6am and 6pm

** Allows multiple logins

Note: Pacific Internet Corporate specialises in the wholesale supply of high-speed Internet access and services to Australian businesses (modem, ISDN, DDS, HDSL), including its new City DSL 2Mbps CBD service, which includes all hardware and no setup fee.

Planet Internet

Green1.a*		
$25	**0**	**$3**
N/A	Unlimited	None
PSDA5.c		**$35**
$25	22	$3
5M	Unlimited	None
PSDA7.a		**$75**
$25	50	$3
5M	Unlimited	None

* Unlimited access midnight to 8am, otherwise hourly fee applies

Telstra Big Pond Home

Casual		**$9.90**
None	3	$5
5M	Unlimited	None
Regular		**$20**
None	7	$4
5M	Unlimited	None
Frequent		**$35**
None	20	$4
5M	Unlimited	None
Power		**$50**
None	30	$3.50
5M	Unlimited	None
Professional		**$80**
None	50	$3
5M	Unlimited	None
Big150*		**$44**
None	150	$3
5M	Unlimited	None

* Available only in Sydney, Melbourne, Brisbane, Perth, Adelaide, Hobart and Canberra. Conditions apply.

TPG Internet

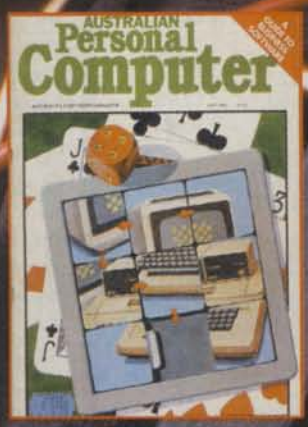
TPG Wild Pack		**None**
$30	Unlimited	None
10M	100M	20c
TPG Value Pack		**$19.95**
$30	Unlimited	None
10M	300M	20c
TPG Easy Pack		**None**
None	None	$1
10M	None	None
TPG Professional Pack		**$25**
None	50	None
10M	Unlimited	None
TPG NiteRider		
None	Unlimited*	None
None	Unlimited	None

* Unlimited between 1am to 8am, EST

Disclaimer

Information contained in this article is based on specifications supplied to *APC* at the time of writing. Readers should check current pricing and specifications with ISPs.

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2000

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ACP Tech

Turn to page 96 for our special subscription offer

ISP results

Connections

ISP	Connect speed
TPG	48.3
Telstra Big Pond	48.2
Lexicon	48.2
Netspace	48.2
Telstra Big Pond Big150	48.2
Planet Internet	48.2
OzEmail OzE200	47.9
ihug	47.8
TPG Unlimited	47.8
OzEmail	47.7
Pacific Internet	47.3
Zip World	47.2
dingo blue	47.2
AAPT Smartchat	47.1
Optus Internet	47.1
ConnectNet	47.1
One.Net	45.8
CompuServe Pacific	45.3
Hotkey	44.6
DIALix	44.3
Orange	44.3
AOL	Unable to test

Ping times

ISP	Australian Average
Lexicon	179
Netspace	179
Telstra Big Pond	195
Zip World	198
Telstra Big Pond Big150	202
AAPT Smartchat	203
dingo blue	204
OzEmail	211
One.Net	214
Orange	220
OzEmail OzE200	221
Pacific Internet	226
Optus Internet	229
Hotkey	241
ConnectNet	265
DIALix	285
Planet Internet	292
TPG	556
TPG Unlimited	561
ihug	588
CompuServe Pacific	837
AOL	1,082

Ping losses

ISP	Australian Average
Optus Internet	0.4%
Telstra Big Pond	0.4%
Zip World	0.4%
Pacific Internet	0.4%
Hotkey	0.5%
dingo blue	0.8%
CompuServe Pacific	0.9%
DIALix	1.2%
Planet Internet	1.4%
AOL	1.6%
Orange	1.8%
Telstra Big Pond Big150	1.9%
Lexicon	2.2%
Netspace	2.2%
TPG Unlimited	3.7%
TPG	4.2%
OzEmail OzE200	4.3%
OzEmail	6.2%
AAPT Smartchat	6.4%
ihug	6.8%
ConnectNet	8.2%
One.Net	10.1%

ISP	Failed connections
Optus Internet	0
OzEmail OzE200	0
Planet Internet	0
Telstra Big Pond	0
Telstra Big Pond Big150	0
Zip World	0
Hotkey	1
Orange	1
Pacific Internet	1
CompuServe Pacific	2
DIALix	2
OzEmail	3
TPG	3
TPG Unlimited	4
ihug	5
ConnectNet	6
One.Net	6
dingo blue	7
AAPT Smartchat	10
Lexicon	17
Netspace	17
AOL	Unable to test

ISP	US average
OzEmail	389
ConnectNet	402
OzEmail OzE200	405
AAPT Smartchat	406
Telstra Big Pond	434
Telstra Big Pond Big150	472
Orange	504
Lexicon	517
Netspace	517
DIALix	529
dingo blue	542
Hotkey	545
Optus Internet	560
One.Net	615
Zip World	616
Planet Internet	619
Pacific Internet	632
TPG	643
TPG Unlimited	647
ihug	673
CompuServe Pacific	723
AOL	781

ISP	US average
dingo blue	3.3%
Pacific Internet	3.4%
Hotkey	3.4%
Optus Internet	3.5%
CompuServe Pacific	3.8%
Telstra Big Pond	3.9%
Telstra Big Pond Big150	4.2%
Lexicon	4.3%
Netspace	4.3%
Zip World	4.3%
DIALix	4.3%
AAPT Smartchat	5.6%
AOL	6.0%
Planet Internet	6.1%
TPG	6.3%
TPG Unlimited	6.4%
Orange	6.6%
OzEmail	9.3%
ConnectNet	10.0%
ihug	10.4%
OzEmail OzE200	10.8%
One.Net	11.9%

HTTP downloads

ISP	Aus HTTP speed
Lexicon	4.7
Netspace	4.7
Telstra Big Pond	4.7
Optus Internet	4.6
DIALix	4.6
dingo blue	4.6
One.Net	4.5
Zip World	4.5
Telstra Big Pond Big150	4.5
OzEmail	4.5
Hotkey	4.5
Orange	4.5
Planet Internet	4.3
Pacific Internet	4.3
ConnectNet	4.2
OzEmail OzE200	4.2
TPG Unlimited	4.0
TPG	4.0
ihug	3.7
AOL	3.3
CompuServe Pacific	2.5
AAPT Smartchat	Unable to test

FTP downloads

ISP	Aus FTP speed
Optus Internet	5.0
OzEmail OzE200	4.9
OzEmail	4.9
dingo blue	4.9
Telstra Big Pond	4.8
Telstra Big Pond Big150	4.8
Orange	4.8
ConnectNet	4.8
Hotkey	4.8
Lexicon	4.7
Netspace	4.7
Zip World	4.7
DIALix	4.7
Pacific Internet	4.7
AAPT Smartchat	4.7
Planet Internet	4.6
One.Net	4.6
CompuServe Pacific	4.4
ihug	4.1
TPG	4.0
TPG Unlimited	3.9
AOL	Unable to test

ISP	Aus FTP failure
Lexicon	0.0%
Netspace	0.0%
Planet Internet	0.0%
Telstra Big Pond	0.0%
TPG Unlimited	0.0%
Zip World	0.0%
Optus Internet	1.0%
Orange	1.0%
DIALix	1.0%
Telstra Big Pond Big150	2.0%
ihug	2.1%
OzEmail OzE200	3.0%
Pacific Internet	3.0%
Hotkey	4.0%
OzEmail	4.1%
dingo blue	4.3%
TPG	5.2%
One.Net	9.6%
AAPT Smartchat	18.9%
ConnectNet	22.3%
CompuServe Pacific	79.6%
AOL	100.0%

ISP	US HTTP speed
Telstra Big Pond	4.7
Lexicon	4.6
Netspace	4.6
OzEmail OzE200	4.3
ConnectNet	4.2
Orange	4.2
OzEmail	4.2
Telstra Big Pond Big150	4.1
Zip World	4.1
TPG	4.0
ihug	4.0
TPG Unlimited	3.9
dingo blue	3.9
Pacific Internet	3.9
Optus Internet	3.9
One.Net	3.8
Hotkey	3.8
DIALix	3.8
Planet Internet	3.7
AOL	3.3
CompuServe Pacific	2.8
AAPT Smartchat	Unable to test

ISP	US FTP speed
Pacific Internet	4.0
AAPT Smartchat	3.9
DIALix	3.9
ConnectNet	3.8
Zip World	3.8
Telstra Big Pond	3.8
Lexicon	3.7
Netspace	3.7
AOL	3.7
Telstra Big Pond Big150	3.7
Planet Internet	3.5
TPG	3.5
Optus Internet	3.5
TPG Unlimited	3.5
Hotkey	3.4
dingo blue	3.3
OzEmail	3.3
ihug	3.3
One.Net	3.2
OzEmail OzE200	3.2
CompuServe Pacific	3.1
Orange	3.1

ISP	US FTP failure
TPG Unlimited	3.1%
Lexicon	3.6%
Netspace	3.6%
Planet Internet	4.0%
Zip World	4.0%
DIALix	4.1%
Optus Internet	5.0%
Telstra Big Pond Big150	5.0%
Orange	5.1%
Pacific Internet	5.1%
CompuServe Pacific	5.1%
Telstra Big Pond	6.0%
Hotkey	6.1%
TPG	6.2%
dingo blue	6.5%
AOL	7.2%
OzEmail OzE200	8.0%
OzEmail	8.2%
AAPT Smartchat	8.9%
ihug	9.5%
One.Net	10.6%
ConnectNet	13.8%

ISP	AAPT Smartchat Internet	AOL	CompuServe Pacific	ConnectNet	DIALix	dingo blue
Phone Online	1300 651 414 http://www.smartchat.net.au/	1300 654 633 http://www.aol.com.au/	1300 555 520 http://www.compuserve.com.au/	1300 363 338 http://www.connect.com.au/	1800 787 057 http://www.dialix.com.au/	1300 551 455 http://www.dingoblue.com.au/
Maximum connect speed	V.90	V.90, K56Flex, x2	V.90, x2	V.90, K56Flex	V.90, K56Flex	V.90, K56Flex
Account types	PPP, dedicated connection	PPP	PPP	PPP, dedicated connection	PPP, shell, dedicated connection	PPP
Payment methods	Credit card, BPay, cheque	Credit card	Credit card, cheque	Credit card, cheque	Credit card, BPay, cheque	Credit card, direct debit
Can users sign up online?	Yes	No	Yes	Yes	Yes	Yes
Support types	Phone, email, Web	Phone, email, Web, live chat support	Phone, email, Web, snail mail, fax, online forums	Phone, email, Web	Phone, email, Web, fax	Phone, email, Web
Support times	Monday to Friday 8am to midnight, Saturday and Sunday midday to 8pm	7 days, 24 hours	Monday to Friday 7am to 7pm, Saturday 8am to 1pm	Monday to Friday 8am to midnight, Saturday and Sunday midday to 8pm	7 days, 24 hours Saturday to Sunday 9am to 5.30pm	Monday to Friday 7am to 9pm,
Services	Web hosting, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, virtual private networks, voice over IP	Web hosting, games servers	Web hosting, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, games servers,online forums JFAX (voicemail and fax to email)	Web hosting, Web site management, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, virtual private networks, telehousing, Intershop, RealMedia, ISP Plus, virtual ISP	Web hosting, Web site management, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training	Web hosting
Local links	204Mbps to Telstra, 12Mbps to OzEmail, 20Mbps to Optus	Did not disclose	None	204Mbps to Telstra, 14Mbps to Optus	Did not disclose	Optus and Telstra
International links	204Mbps to Telstra, 20Mbps to Optus	Did not disclose	2x 1.5Mbps to CompuServe US	18Mbps Optus	Did not disclose	Optus
Peering links	*2Mbps to Netscape*	*Did not disclose*	384Kbps to CompuServe NZ, 768Kbps to CompuServe Singapore	12Mbps to OzEmail, 2Mbps to Netscape	Did not disclose	Did not disclose
International access	GRIC (Global Roaming Internet Connection)	AOL in 120 countries	CompuServe network in 185 countries	GRIC	GRIC	None
User to modem ratio	10:1	Did not disclose	Did not disclose	Did not disclose	6:1	Did not disclose

Disclaimer

Information contained in this article is based on specifications supplied to APC by ISPs at time of writing, except for Planet Internet, which was sourced from publicly available material and previously submitted details. Readers should check current pricing and specifications with ISPs.

ISP	Hotkey	ihug	Lexicon Internet Services	Netspace	One.Net	Optus Internet
Phone Online	1300 655 366 http://www.hotkey.net.au/	(02) 9324 1500 http:/www.ihug.com.au/	1300 369 030 http://www.lexicon.net/	1300 360 025 http://www.netspace.net.au/	1300 303 312 http://www.one.net.au/	1300 301 325 http://www.optusnet.com.au/
Maximum connect speed	V.90	V.90	V.90	V.90, K56Flex	V.90, K56Flex, x2	V.90
Account types	PPP, SLIP, dedicated connection	PPP	PPP, dedicated connection	PPP, SLIP, shell, dedicated connection	PPP, dedicated connection	PPP
Payment methods	Credit card, direct debit, BPay, cheque	Credit card, cheque	Credit card, direct debit, cheque	Credit card, direct debit, cheque	Credit card, cheque direct debit, BPay,	Credit card
Can users sign up online?	No	No	Yes	No	No	No
Support types	Phone, email, Web, onsite support	Phone, email, Web	Phone, email, Web	Phone, email, Web, fax	Phone, email, Web	Phone, email, Web
Support times	7 days, 8am to 9pm	7 days, 24 hours	8am to 8pm weekdays, midday to 4pm weekends	Monday to Friday 9am to 9pm, Saturday and Sunday 10am to 6pm	Monday to Friday 8am to 2am, Saturday 9am to midnight, Sunday 10am to midnight	7 days, 24 hours
Support fees	None, except for onsite support	None	None	None	Free for account setup, $9.50 for 72 consecutive hours' higher-level support	None
Services	Web hosting, Web site management, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, virtual private networks, games servers	Web hosting, domain name registration and hosting, games servers	Web hosting, domain name registration and hosting, virtual private networks, games servers	Web hosting, Web site management, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, virtual private networks, voice over IP, games servers, filtering	Web hosting, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, virtual private networks, games servers, Web-based email	Web hosting, domain name registration and hosting, secure Web sites for ecommerce, virtual private networks, voice over IP, SMS messaging or paging, Internet consulting
Local links	2x 34Mbps, 32x 2Mbps Telstra, 2x 24Mbps Optus	6Mbps to Telstra	2Mbps Telstra, 2Mbps Connect (Melbourne POP only)	4Mbps to Connect, 2Mbps to Telstra	Did not disclose	Optus ATM backbone
International links	Did not disclose	6Mbps to GlobalOne, 45Mbps satellite	2Mbps Telstra, 2Mbps Connect (Melbourne only), 512Kbps satellite (Melbourne Only)	9Mbps to UUNet, 10Mbps to Abovent	Did not disclose	C&W Global Network
Peering links	Did not disclose	1Mbps to AusBone	10Mbps AusBone (Melbourne only)	1Mbps to Access One, 2Mbps to Melb-Nap, 2Mbps to WAIX, 2Mbps to SAIX	Did not disclose	Did not disclose
International access	None	Did not disclose	Did not disclose	iPass	Did not disclose	iPass and C&W Global (both corporate only)
User to modem ratio	Did not disclose	5:1	Did not disclose	10:1	10:1	Did not disclose

ISP	Orange	OzEmail Internet	Pacific Internet	Planet Internet	Telstra Big Pond Home	TPG	Zip World/ Pacific Internet Corporate
Phone	13 31 78	13 28 84	1300 555 075	1300 364 345	1800 804 282	1300 360 855	1300 555 074
Online	http://www.orange.net.au/	http://www.ozemail.com.au/	http://www.pacific.net.au/	http://www.planet.net.au/	http://www.bigpond.com/	http://www.tpg.com.au/	http://www.zipworld.com.au/
Maximum connect speed	V.90, K56Flex	K56Flex, x2	V.90	V.90	V.90, K56Flex	V.90, K56Flex	V.90
Account types	PPP, dedicated connection	PPP, dedicated connection	PPP, dedicated connection	PPP, dedicated connection	PPP	PPP, dedicated connection	PPP, shell, dedicated connection
Payment methods	Credit card, direct debit, cheque	Credit card	Credit card, direct debit, cheque	Credit card	Credit card	Credit card, direct debit, BPay, cheque	Credit card, direct debit, cheque
Can users sign up online?	No	No	Yes	Yes	Yes	Yes	Yes
Support types	Phone, email, Web	Phone, email, Web, fax, online chat	Phone, email, Web	Phone, email, Web	Phone, email, Web	Phone, email, Web	Phone, email, Web, onsite
Support times	Monday to Friday 8am to 8pm	7 days, 24 hours	7 days, 24 hours	Monday to Friday 7am to 10pm	7 days, 8am to midnight	Monday to Friday 8am to midnight; Saturday 9am to 10pm; Sunday 10am to 8pm	Monday to Friday 10am to 8pm
Support fees	None	None	None	None	None	80 cents a minute	None
Services	Web hosting, Web site management, domain name registration and hosting, secure Web sites for ecommerce, virtual private networks, SMS messaging or paging	Web hosting, domain name registration and hosting, virtual private networks, SMTP gateway, UUCP gateway, alias addressing, OzEmail content services	Web hosting, domain name registration and hosting, Internet consulting and training, Web/database integration	Not disclosed	Web hosting, domain name registration and hosting, Internet consulting and training, games servers, mail forwarding	Web hosting, Web site management, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, virtual private networks, games servers, satellite bandwidth for 128K and corporate connections	Web hosting, Web site management, domain name registration and hosting, secure Web sites for ecommerce, Internet consulting and training, virtual private networks, voice over IP, SMS messaging or paging, games servers, server co-location, wholesale bandwidth
Local links	Did not disclose	Did not disclose	2Mbps to Telstra, 2Mbps to Access One, 2Mbps to VIX/AusBone	Did not disclose	Did not disclose	8Mbps to Telstra	2Mbps to Telstra, 4Mbps to Connect, 4Mbps to Optus
International links	Did not disclose	45Mbps satellite	10Mbps Optus (Sydney & Melbourne), 45Mbps satellite (Sydney)	Did not disclose	Did not disclose	45Mbps satellite	17Mbps to The Internet Group
Peering links	Did not disclose	Telstra, ConnectNet	2Mbps to VIX/AusBone	Did not disclose	Did not disclose	Did not disclose	2Mbps to AusBone, 2Mbps to Zircon/Internet Plus, 2 Mbps to Zeta, 2 Mbps to Amaze, 2 Mbps to FlexIT
International access	N/A	iPass	iPass	Did not disclose	GRIC	None	iPass
User to modem ratio	Did not disclose	Did not disclose	Did not disclose	Did not disclose	Did not disclose	6:1	8:1

Points of presence (POPs)

AAPT Smartchat Internet

ACT: Canberra
NSW: Sydney, Albury, Armidale, Broken Hill, Campbelltown, Cooma, Coffs Harbour, Dubbo, Gosford, Goulburn, Griffith, Lismore, Lithgow, Newcastle, Nowra, Orange, Penrith, Port Macquarie, Tamworth, Taree, Wagga Wagga, Wollongong
NT: Darwin, Alice Springs
Qld: Brisbane, Bundaberg, Cairns, Gold Coast, Mackay, Rockhampton, Sunshine Coast, Toowoomba, Townsville
SA: Adelaide, Booleroo, Cleve, Coober Pedy, Cowell, Jamestown, Port Augusta, Port Lincoln, Streaky Bay, Tumby Bay, Wudinna
Tas: Hobart, Burnie, Devonport, Launceston
Vic: Melbourne, Geelong, Mornington, Sale
WA: Perth

AOL

ACT: Canberra
NSW: Sydney, Albury, Campbelltown, Gosford, Lismore, Newcastle, Orange, Penrith, Port Macquarie, Wollongong, Wagga Wagga
NT: Darwin
Qld: Brisbane, Gold Coast, Bundaberg, Cairns, Mackay, Rockhampton, Sunshine Coast, Townsville, Toowoomba
SA: Adelaide
Tas: Hobart, Launceston
Vic: Melbourne, Ballarat, Bendigo, Geelong, Mornington, Shepparton
WA: Perth

CompuServe Pacific

ACT: Canberra
NSW: Sydney, Newcastle
NT: Darwin
Qld: Brisbane, Gold Coast
SA: Adelaide
Tas: Hobart
Vic: Melbourne
WA: Perth

ConnectNet

ACT: Canberra
NSW: Sydney, Albury, Armidale, Bathurst, Campbelltown, Dubbo, Gosford, Grafton, Lismore, Newcastle, Penrith, Port Macquarie, Tamworth, Taree, Wagga Wagga, Wollongong
NT: Darwin
Qld: Brisbane, Bundaberg, Cairns, Gladstone, Gold Coast, Mount Isa, Mackay, Maroochydore, Rockhampton, Toowoomba, Townsville
SA: Adelaide, Gawler, Mount Gambier, Port Augusta
Tas: Hobart
Vic: Melbourne, Ballarat, Bendigo, Dandenong, Geelong, Nunawading, Shepparton
WA: Perth, Bunbury, Broome, Geraldton, Kalgoorlie, Katanning, Rockingham

DIALix

ACT: Canberra
NSW: Sydney, Albury, Armidale, Bathurst, Camden, Campbelltown, Dubbo, Gosford, Grafton, Lismore, Mulgoa, Newcastle, Penrith, Port Macquarie, Tamworth, Taree, Wagga Wagga, Windsor, Wisemans Ferry, Wollongong
NT: Darwin
Qld: Brisbane, Bundaberg, Cairns, Gladstone, Gold Coast, Mackay, Maroochydore, Mount Isa, Rockhampton, Toowoomba, Townsville
SA: Adelaide, Gawler, Mount Gambier
Tas: Hobart
Vic: Melbourne, Ballarat, Bendigo, Mornington, Dandenong, Geelong, Shepparton
WA: Perth, Broome, Bunbury, Geraldton, Kalgoorlie, Katanning, Rockingham

dingo blue

ACT: Canberra
NSW: Sydney, Albury, Armidale, Campbelltown, Coffs Harbour, Gosford, Katoomba, Lismore, Moree, Newcastle, Nowra, Orange, Port Macquarie, Tamworth, Wagga Wagga, Wollongong
NT: Darwin
Qld: Brisbane, Bundaberg, Cairns, Gold Coast, Hervey Bay, Kingaroy, Mackay, Rockhampton, Sunshine Coast, Toowoomba, Townsville
SA: Adelaide
Tas: Hobart
Vic: Melbourne, Ballarat, Bendigo, Geelong, Mildura
WA: Perth

Hotkey

ACT: Canberra
NSW: Sydney, Albury, Bega, Campbelltown, Coffs Harbour, Dubbo, Dural, Gosford, Goulburn, Grafton, Lismore, Liverpool, Newcastle, Nowra, Orange, Richmond, Tamworth, Taree, Wagga Wagga, Wollongong
Qld: Brisbane, Bundaberg, Cairns, Cleveland, Gold Coast, Mackay, Maroochydore, Maryborough, Rockhampton, Toowoomba, Townsville, Samford
SA: Adelaide, Gawler, Mount Barker, Salisbury
Tas: Hobart, Launceston
Vic: Melbourne, Ballarat, Bendigo, Colac, Dandenong, Geelong, Gisborne, Kalkallo, Morwell, Shepparton, Wangaratta, Warnambool, Warragul, Werribee
WA: Perth, Bunbury, Herne Hill, Kalgoorlie, Spearwood
NT: Darwin

ihug

NSW: Sydney
Qld: Brisbane
Vic: Melbourne

Lexicon Internet Services

Vic: Melbourne, Bendigo, Geelong, Healesville
Qld: Brisbane, Buderim, Cairns, Gympie
NSW:Sydney, Gosford, Murwillumbah, Windsor
SA: Adelaide
ACT: Canberra
WA: Perth

Netspace

ACT: Canberra
NSW: Sydney, Newcastle, Wollongong
Qld: Brisbane, Gold Coast
SA: Adelaide

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Group Managing Director
StarBuck Integration Services



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(+)must be an advertised identical product offer. (*)offer expires 30.04.00

Points of presence (POPs)

Tas: Hobart, Launceston
Vic: Melbourne, Cranbourne, Geelong, Sale, Traralgon, Yarram
WA: Perth

One.Net

ACT: Canberra
NSW: Sydney, Albury, Bega, Campbelltown, Coffs Harbour, Gosford, Lismore, Newcastle, Penrith, Port Macquarie, Richmond, Taree, Wagga Wagga, Wollongong
NT: Darwin
Qld: Brisbane, Cairns, Caboolture, Gold Coast, Mount Isa, Maroochydore, Rockhampton, Sunshine Coast, Townsville
SA: Adelaide
Tas: Hobart, Launceston
Vic: Melbourne, Bendigo, Geelong
WA: Perth

Optus Internet

NSW: Sydney, Albury, Armidale, Branxton, Campbelltown, Cessnock, Coffs Harbour, Gosford, Gunnedah, Johns River, Kempsey, Kurri Kurri, Lawson, Lismore, Macksville, Maitland, Marulan, Moree, Nambucca Heads, Narrabri, Newcastle, Nowra, Orange, Port Macquarie, Quirindi, Richmond, Tamworth, Taree, Telegraph Point, Uralla, Wagga Wagga, Walcha, Werrington, Werris Creek, Windsor, Wollongong
ACT: Canberra
NT: Darwin
Qld: Brisbane, Bundaberg, Burpengary, Caboolture, Cairns, Gold Coast, Hervey Bay, Mackay, Rockhampton, Scarborough, Sunshine Coast, Toowoomba, Townsville
SA: Adelaide
Tas: Hobart
Vic: Melbourne, Ballarat, Bendigo, Cranburne, Dandenong, Geelong, Mildura, Mornington
WA: Perth, Kwinana, Spearwood

Orange

NSW: Sydney
Qld: Brisbane
SA: Adelaide
Vic: Melbourne
WA: Perth

OzEmail Internet

NSW: Albury, Armidale, Broken Hill, Campbelltown, Cooma, Coffs Harbour, Dubbo, Gosford, Goulburn, Griffith, Lismore, Lithgow, Newcastle, Nowra, Orange, Penrith, Port Macquarie, Sydney, Tamworth, Taree, Wagga Wagga, Wollongong
Vic: Melbourne, Geelong, Mornington, Sale
Qld: Brisbane, Bundaberg, Cairns, Gold Coast, Mackay, Rockhampton, Sunshine Coast, Toowoomba, Townsville
SA: Adelaide, Booleroo, Cleve, Coober Pedy, Cowell, Jamestown, Port Augusta, Port Lincoln, Streaky Bay, Tumby Bay, Wudinna
WA: Perth
NT: Darwin, Alice Springs
Tas: Hobart, Burnie, Devonport, Launceston
ACT: Canberra

Pacific Internet

NSW: Sydney
Qld: Brisbane
SA: Adelaide
Vic: Melbourne
WA: Perth

Planet Internet

ACT: Canberra
NSW: Sydney, Blacktown, Dural, Liverpool
Qld: Brisbane, Cleveland, Ipswich, Samford, Redcliffe
SA: Adelaide
Vic: Melbourne, Dandenong, Sunbury, Whittlesea

Telstra Big Pond Home

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NT: Darwin, Alice Springs
Qld: Brisbane, Bundaberg, Cairns, Gladstone, Maroochydore, Mount Isa, Rockhampton, Southport, Strathpine, Maryborough, Toowoomba, Townsville
SA: Adelaide, Mount Gambier, Port Augusta
Tas: Hobart, Burnie, Devonport, Launceston
Vic: Melbourne, Ballarat, Bendigo, Cranbourne, Geelong, Mildura, Morwell, Shepparton, Warrnambool
WA: Perth, Bunbury, Geraldton, Kalgoorlie, Rockingham

TPG

ACT: Canberra
NSW: Sydney, Albury, Armidale, Bathurst, Coffs Harbour, Coonabarabran, Coonamble, Dubbo, Gilgandra, Gloucester, Gosford, Goulburn, Grafton, Hay, Kiama/Wollongong, Lake Macquarie/Newcastle, Nowra, Old Bonalbo, Penrith, Port Macquarie, Tamworth, Taree, Tumut, Wagga Wagga
NT: Darwin, Alice Springs
Qld: Brisbane, Ayr, Atherton, Barcaldine, Biloela, Bowen, Bundaberg, Cairns, Cooktown, Emerald, Gladstone, Gympie, Hughenden, Longreach, Mackay, Mareeba, Mount Isa, Normanton, Proserpine, Richmond, Rockhampton, Roma, Southport, Toowoomba, Townsville, Winton
SA: Adelaide, Ceduna
Tas: Hobart, Launceston
Vic: Melbourne, Ballarat, Bendigo, Geelong, Leongatha, Lilydale, Mornington, Morwell, Sale, Shepparton, Swifts Creek, Warragul, Warrnambool, Woomelang
WA: Perth, Broome, Bunbury, Kalgoorlie

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NSW: Sydney, Camden, Campbelltown, Gosford, Helensburgh, Mulgoa, Penrith, Windsor, Wisemans Ferry, Wollongong
Qld: Brisbane
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SA: Adelaide
WA: Perth

Workshop

Welcome to Workshop, the section dedicated to bringing you all manner of tips, interesting information and do-it-yourself tutorials. In these pages you'll find useful shareware, informative OS-specific columns and in-depth programming tutorials.

All files mentioned in Workshop can be found on **apcmag.cd**. Join one of the **apcmag.com** online forums to discuss technical issues or to voice your opinion on any related topic.

Workshop is a reader-input section. Please send us your ideas, comments or criticisms via email to workshop@acptech.net, or snail mail to *APC* Workshop, PO Box 4088, Sydney NSW 1028.

A full archive of Workshop articles can be found online at http://apcmag.com/workshop/.

Andrew Colley, Workshop coordinator

Tech Talk

Technobabble draws a historical map of the development of microcomputing, from valve to silicon-based computers. **Step by Step** shows you a few rapid Windows reinstallation techniques.

Operating Systems

The **Windows 98** column features a low-level examination of the humble hard drive, exploring disk partitions and the FAT file system. In a two-part special edition of the **Linux** column, *APC* continues its coverage of SSH, with an added guide to gaming on the Linux platform. It includes reviews of the most popular games currently ported to the platform. **PDAs** shows you how to access your desktop email from your PalmPilot, so you can read it on the move. The **Mac OS** column offers a guide to iTools, Apple's new but flawed online service. The **OS/2 Warp** column sings the virtues of HPFS.

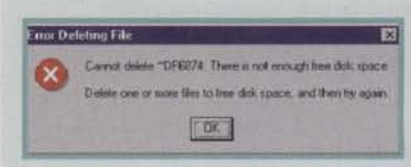
The OS columns have a summary of the best shareware for each platform. Full reviews and trial copies can be found on **apcmag.cd**.

Programming

The **Simple C++** column demonstrates how templates can save you hours of laborious coding and recoding. The **Java** column moves to the next phase in graphics programming: complex geometric shapes.

Bug of the month

This month's bugster is Peter Coxen. OK, life wasn't meant to be easy, but this is *really pushing things.*



For his pain, Peter wins his choice of prizes from the vast collection of the BOTM prize cupboard. Unfortunately, any software prizes will be of limited use, because his hard disk is still full.

Win! Win! Win!

Workshop is always on the lookout for the most interesting, strange, funny or downright weird software bugs you can find. These include code snippets, features that function poorly, or things that crash a particular application. Anything and everything buggy deserves mention.

Send us your favourite bug via email to bugs@acptech.net or snail mail to *APC* Bug of the Month, PO Box 4088, Sydney NSW 1028, and you'll be in the running to win a software prize. Please send screen captures, example code listings or detailed instructions to trigger a bug in an application, as appropriate for your entry.

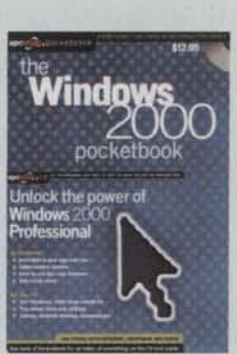
The winner's name, along with details of the bug, will appear in this column in *APC* June. So start hunting!

Michael Smith

Pocketbooks

Be one of the first to unlock the power of Windows 2000 Professional with *The Windows 2000 Pocketbook*, a clear and comprehensive guide to Microsoft's latest Windows operating system.

The Pocketbook contains all the programs and tools you need to make the most of Windows 2000 Professional, including installation and upgrade tips, and optimisation tweaks. The Pocketbook CD is jam-packed with the latest tools and utilities, games, desktop themes, and more.



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The history of circuitry, and the role it plays in your computer. **By Alex Kidman**

Technobabble

Over the last two months, this column has looked at how logic works within computers. This month, we'll move onto the basic building block that implements this logic: circuits.

Circuit to me

Having worked out how to count, add and store memory, the next thing you need to do to set up a computer system is to build something capable of performing these functions. You need a system to carry electrical charges to represent your various data states, and something to interpret the results on the other end.

On the charge-carrying front, if all you needed to do was carry an electrical signal, then simple conductive wire could do the trick. Because modern PCs are capable of literally billions of calculations, you'd need an awful lot of wires. The very first computing machines (beyond abacuses, which do compute) were mechanical, and used physical relays — hence their huge size. A relay is a mechanical switch that uses an electromagnet to move a solid metal arm between positions as a switch. When you 'switch on' a relay, the electromagnet kicks in and attracts the arm to complete the circuit, allowing current to flow.

The most common relay you're likely to find is a light switch. When you turn it on, a circuit is joined and your light bulb gets power. Without the electromagnetic attraction, the circuit is not completed and power will not flow. It's not a huge jump to see that by regulating power flow with a relay, you can form simple Boolean gates through the application of either having or not having a power flow. The problem is, of course, that a physical switch relay takes up a lot of space. To build a modern PC that can do 1 billion calculations a second, you would need at least 1 billion switches. Moreover, switches (and indeed any physical parts) tend to wear out after a while — the solution was to move to a system that used electrical charges and static components.

Enter ENIAC

ENIAC (Electronic Numerical Integrator and Computer) is widely regarded as the first modern computer. It ran at less than 1MHz, weighed about 3 tonnes, and its development — from inception to launch date — took three years. ENIAC replaced the old mechanical relays with vacuum tubes. Like a lot of technological innovation in the 20th century, its development was driven by military needs; it calculated firing trajectories. Of course, ENIAC, like all valve-based computing of the era, was less than perfect. Computer valves were prone to failure, they generated a lot of heat and, above all, were bulky.

The next milestone in circuit technology was transistors, which began the slow crawl to miniaturisation. The transistor, first realised back in 1947, is basically a regulator for electrical flow. As discussed, electrical flow can be used to simulate logic paths, and thus perform computing functions.

Transistors became possible because of the special properties of electrical semiconductors. Electrical semiconductors, as the name implies, are capable of conducting electricity, but only under certain conditions. Transistors need extra energy to conduct electricity, which is usually a second electrical source. The first transistors were a vast improvement on valves, but they were still large, and soldering hundreds of transistors onto a circuit board required lots of fiddly work. The next and most obvious goal was to make it smaller — the smaller version of the transistor was the integrated circuit (IC).

What's really impressive about the history of the integrated circuit is that two people invented the concept at the same time — Jack Kilby at Texas Instruments, and Robert Noyce at Fairchild Semiconductor. Technically, Kilby was first, but the US patent office recorded two patents — one for an IC based on a wafer of germanium (Kilby), one for an IC on silicon (Noyce).

A little bit of nifty cross-marketing later, and the IC industry was born. It is Noyce's invention that has been developed over the years, and it's more than likely that Noyce's company supplied your PC processor, as he later went on to found Intel. In the meantime, Kilby didn't exactly fade away. He still had the patent, and his first practical example of its use was the pocket calculator.

Microns?

Silicon etching processes are commonly referred to in terms of the width of the silicon pathways etched onto each chip. If you take a chunk of silicon and scrape pathways on it with a knife with a 1mm-wide blade, you are using a 1mm process. Silicon circuits are etched more finely; so much so that they must be measured in microns (a micron is one millionth of a metre, or one-thousandth of a millimetre in width).

The actual process has vastly improved in the last few years. Circuit manufacturers are able to create pathways as small as 0.07 microns, although that size isn't used in commercial processors yet. At the time of writing, new processors use an 0.18-micron process. The construction process is still far from perfect, however, and the high cost of complex circuitry can be attributed in part to the amount of circuits expected to fail in each batch, due to manufacturing errors or minute impurities in the silicon. When you consider that you're working with a material that is 0.18 of one-millionth of a metre in size, you can appreciate why this is so.

So, how does an IC work? By chemically regulating the exact properties of a semiconductor (in this case, silicon), you can control the flow of electricity through it, in much the same way as with transistors. The difference is in the scale — on a silicon wafer with a tiny circuit path, logic gates can be imprinted en masse, with less human intervention in the creation process. This development meant that ICs could be mass produced at low cost.

Instead of needing a separate component for transmitting, regulating and recording charges (ie. the components of your logic gate), integrated circuits put everything on a single wafer of silicon. As manufacturing processes have improved, the number of circuits fitted onto a wafer of silicon has increased (see *APC* February, page 78). Integrated circuits can be used for almost any control, quantifying operation and memory application, so the circuitry isn't computer-specific.

Silicon

Silicon is the material of choice for designing, building and implementing ICs. Why? It's relatively reliable, semiconductive in the right fashion, and cheap. It's also easy to find — silicon is the second most abundant element on earth.

Silicon wafers are manufactured by growing pure silicon crystals under specific conditions in a clean environment. These crystals are then sliced up into wafers, chemically treated and have pathways (logic gates) imprinted on them. First, the silicon is coated with a masking substance that reacts with an electromagnetic wave source — usually ultraviolet light, although experiments with other wave forms (such as gamma radiation) have been able to produce even smaller circuit pathways.

The circuit maps are then burnt onto the masking substance, which can then be washed away to leave the silicon circuit paths. The paths work because of the way they're chemically treated. Electrons are arranged so that they (in effect) flow along the circuits when a charge is pushed down the circuit pathways. A charge is sent down a pathway, or not sent down a pathway, depending on the circuit design. This flexibility allows electrical engineers to create chips capable of processing signals for a wide range of purposes.

From ICs to microprocessors

Any IC can be described by the number of circuits that are imprinted on it. An ordinary small-scale integrated circuit (SSI) may only have a few (typically, less than 100) circuits on it, while a very large-scale integrated circuit (VLSI) circuit may have hundreds of thousands.

If the IC revolution hadn't progressed further than putting circuitry onto silicon wafers, the average computer would still be large by today's standards — after all, you'd need separate wafers for each step of data processing.

The next evolutionary milestone was the development of microprocessors. A microprocessor simply takes the miniaturisation trend, and builds upon it in a computer-specific environment by placing all the elements needed for computing onto a single chip. Next month's Technobabble will move onto microprocessing and CPUs.

Alex Kidman can be contacted at alexk@acptech.net. For a complete archive of *APC* Technobabble columns, see http://apcmag.com/babble/.



A guide to reinstalling Windows with a minimum of fuss. **By Daniel Rutter**

Step by Step

Windows 95 and 98 will, in normal use, slowly pollute themselves until error messages appear with annoying frequency. So how do you do zap the old install of Windows and replace it with a new one, quickly and easily? Preparation is the key. Most of the preparation can be done on a creaky old system. However, this simple reinstall strategy does require a few hundred megabytes of free hard disk space.

Step one

Copy your Windows files to the hard drive. Copy the entire Win95 or Win98 directory from your installation CD to your hard disk by clicking on its folder icon and dragging it over to the drive. You will need about 174M of free space for Windows 98, and about 95M for Windows 95. This allows you to reinstall Windows from your hard drive rather than from the CD-ROM drive. Installing from the hard drive is faster, and you won't need to reach for the CD every time you replace a driver or change a Windows system setting later on. Windows remembers where it was installed from, so it will look for its files there in the future.

If you don't have room for the Windows installation files, make sure that the boot disk you'll need later (step three) will give you access to your CD-ROM drive.

When you install a new piece of hardware, store its driver software on your hard drive too. Don't worry about using too much space; hardware support software packages often require an entire CD, but the actual driver installation directory (generally labelled Win95) is usually small.

Creating a directory called C:\DRIVERS\ turns hardware redetection and reinstallation into a no-brainer. Whenever Windows wants a driver, select the option that tells it to search for a driver. To specify the location, click Browse and navigate to the subdirectory you created to store your drivers (in our example, C:\DRIVERS\).

Step two

Back up your data files. After reinstalling Windows, you need to replace your applications as well. Email client applications often overwrite their old data files if they are reinstalled to their original locations. You should regularly back up your data, but if you don't, make copies of everything you want to keep, whether you think it's likely to be overwritten or not. This includes your Web browser bookmarks.

Step three

Prepare a boot disk. Make a boot floppy with various DOS commands on it in Windows 95 or 98 by clicking the Add/Remove Programs icon in the Control Panel, selecting Startup Disk, then clicking the Create Disk button. Windows 98 creates a better startup disk than Windows 95, because it has a set of one-size-fits-all CD-ROM drivers on the disk; when you boot with it, the startup disk will ask you if you want to start your system with or without CD-ROM support. Respond in the affirmative if you had no room for the Windows installation files on your hard drive at step one. If you ask for CD access, it will try each driver in its quiver until it finds one that works — it's highly unlikely not to.

To make a Windows 95 startup disk to give you access to your CD-ROM drive, add DOS CD-ROM drivers to it manually, and edit the disks AUTOEXEC.BAT and CONFIG.SYS files accordingly. It's possible you never received DOS drivers for your CD-ROM. If you've copied the Windows installation files to your hard drive in step one, you won't need CD-ROM access at all.

Step four

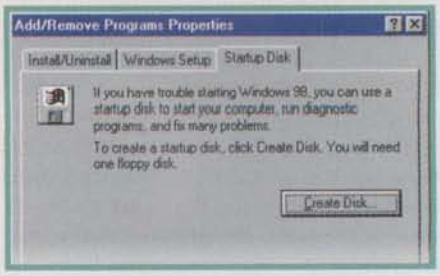
Place your boot disk in the drive and restart the computer. Your system should boot from the floppy disk, unless this option is disabled (or the boot device order has been changed) in your BIOS.

Step five

At the DOS prompt, rename your old Windows directory. A good name for the old Windows directory is oldwin. Assuming your Windows directory had the default name, 'Windows', beforehand, type:

```
ren windows oldwin
```

The only reason not to do this would be if you didn't have enough room on your



hard drive for a second Windows directory. Depending on which installation options you chose, you may need up to 255M for a full Windows 98 installation.

Step six

Run the Windows setup program, and change the directory to wherever your Windows files are. If you've copied them to C:\WIN98\ at the C:\> prompt, type:

```
cd win98
```

If you have adapted this reinstall method and copied your installation files to a second hard disk labelled D:, then type:

```
cd d:
cd win98
```

The setup program is called SETUP.EXE, Once you switch to the directory where you copied the installation files, just type setup.

When the install starts, Windows will detect the previous install in the old, renamed Windows directory, and will (by default) try to reinstall Windows there. You'll need to intervene and specify C:\WINDOWS (or whatever your Windows directory is to be called) as the installation location instead. After that, Windows forgets about the old installation completely, and the installation will proceed like a fresh install. Once the installation is complete and Windows restarts, you can delete the oldwin directory (after taking the contents of its Desktop directory and overwriting your new C:\WINDOWS\DESKTOP, if you like). You now have a fresh system.

Daniel Rutter can be contacted at dan@dansdata.com. For a complete archive of *APC* Step by Step columns, see http://apcmag.com/step/.

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Cat. 2315	Bi-directional 2 Port	$61
Cat. 2316	Bi-directional 3 Port	$97
Cat. 2235	ECP/EPP 1 Port	$65
Cat. 2236	ECP/EPP 2 Port	$69

Also available, are single & dual port Plug & Play PCI printer cards.

Cat. 2618	1 Port Printer PnP PCI	$79
Cat. 2687	1 Port ECP/EPP/SPP PnP PCI	$83
Cat. 2619	2 Port Printer PnP PCI	$119
Cat. 2688	2 Port ECP/EPP/SPP PnP PCI	$125

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An internet access server combined with a 10/100 ethernet hub with 7 ports and 1 uplink port as well as a printer server, a fax server and a virtual email server, all in one box. There are two RS232 ports to provide additional bandwidth to the Internet. Up to 253 users on the network can have simultaneous access to the Internet. A hardware-based firewall ensures security, while dial on demand minimises connect time. It also has a built in DHCP server.

Cat. 10118 Internet Access / Fax / Print / Email Server & 7 Port UTP Hub 10/100Mbps $699

VGA Surveillance Monitoring Hub



Plug in up to six cameras and display them on a PC monitor. Video recording can be configured to turn on with motion detection. Captured video can be compressed and stored on the hard disk and time and date stamped. The unit can be monitored or controlled remotely with individual camera control. The included software runs under Win95 or 98.

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Intelligent Network tester with LCD Display



An intelligent continuity tester for LAN cables that saves time on the job. It tests a range of Modular cables including 10Base-T (Category 3-5). Four numbered remote terminators allow testing, tracing and identification of in situ cables. The LCD display shows the pin connections as well as the wiring scheme detected.

Cat. 11518	Intelligent Network Tester	$229
Cat. 11519	Network Tester with LCD	$239

Hot Swap IDE Mobile Rack HDD Kit



The Mobile Rack is the perfect solution for data backup & transporting data between computers. The kit consists of a 5.25" mounting rack and a removable tray for a 3.5" hard disk and simply mounts in a standard 5.25" half-height bay. The tray can be easily removed so data can be taken off site or locked in a safe for security purposes. These kits enable the user to move data between home and office as well as being able to swap easily between multiple operating systems. The hot-swap model has a software utility, which enables you to remove & replace the drive in the PC without having to reboot or shut down your system.

Cat. 6614	Mobile HDD Kit IDE Hot Swap	$159
Cat. 6610	Mobile HDD Kit IDE	$69
Cat. 6611	Mobile Rack IDE Tray Only	$39
Cat. 6615	Mobile HDD Kit IDE Ultra DMA	$89
Cat. 6612	Mobile HDD Kit SCSI	$79
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Avoid downtime delays when your hard drive fails! This unit enables the user to replace the hard disk while the PC is operating and it automatically resynchronizes itself to full operation. The RAID unit fits into two continuous 5.25" bays and includes a controller and two removable frames. The array accepts two EIDE, Ultra DMA 66/33 or PIO 4 hard drives. The controller provides RAID Level 1 disk mirroring. It can also be used as an on-line hard drive copier.

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Workshop

Windows 98

Unlocking the mystery of partitions and the FAT file system. **By Kieran McNamee**

This month's column delves into the fascinating world of sectors, clusters and file allocation tables. We also tackle the confusing issue of whether you should convert from FAT16 to FAT32.

Hard disks and partitions

Although it's often taken for granted, the hard disk is a crucial component in any computer system. The hard disk is made up of a number of double-sided platters which are stacked around a common axle and store data magnetically. During a low-level format, these platters are divided into tracks, sectors and cylinders and given ID numbers so that the read/write head knows where to read and write certain pieces of data.

Each track is a concentric circle, much like the grooves on a vinyl record. The term 'cylinder' refers to all the vertically aligned concentric circles through the stack of platters. Sectors divide the tracks into more manageable regions, in the same way that you slice up an apple pie.

When all the tracks and sectors have been defined through a low-level format (generally performed during the manufacturing process), it is then time to partition the disk. A partition is simply a logical division of your hard disk. All hard disks have one or more partitions and there are many reasons for creating multiple partitions.

In the past, it was common practice for Windows users to divide large hard disks into partitions to minimise the amount of space wasted by the 16-bit file allocation table format (FAT16).

You can also use separate partitions as a measure against data loss. You can store all your Windows files on one partition, your program files on another and your data files on yet another. This protects data files from being lost if if the system partition fails.

Another common reason for dividing your hard disk into several partitions is to install multiple operating systems on your computer. Each operating system you install will require its own partition, and some operating systems, such as Linux, require more than one partition. If you have multiple operating systems on individual partitions, not all of the partitions will be visible to each operating system. For instance, if you use Windows 98, Windows Explorer will only be able to view partitions that have been formatted using the FAT16 or FAT32 file system.

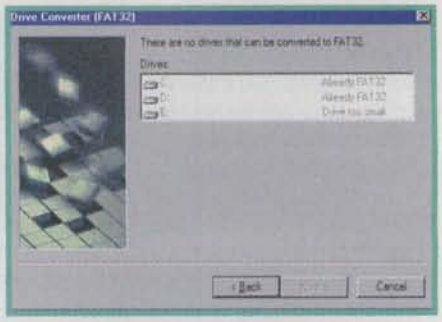
Four primary partitions are allowed on a hard disk, one of which may be an extended type. An extended partition can be divided into as many logical partitions as required. The extended partition acts as a container for the logical partitions.

Labelling these partitions does not happen randomly, and drive letters are never permanently assigned (with the possible exception of drives A and B, which are reserved for floppy drives). As a rule, your system will attempt to boot the *active* partition regardless of whether an OS resides within it — there can only be one active partition and it is usually a primary partition. You can create additional hidden primary partitions on your disk and use a boot manager to select the partition you want to boot. In this scenario, the small partition in which the boot manager resides would be the active partition. The partition that your boot manager instructs the system to start will be labelled C: and made visible. Any other visible partitions will be relabelled. Windows must boot from a primary partition and from the first physical disk in the system.

Drive letters are assigned in parallel with alphabetic sequence. Primary partitions on all disks take precedence over logical drives in the DOS/Windows hierarchy and are assigned a letter before the logical partitions receive theirs. Partitions that are not FAT16 or FAT32 will not be visible to Windows 98 and will not be assigned letters.

FAT16 and FAT32

The file system is responsible for organising data on the hard disk and keeping track of where every piece of data is stored. The FAT16 file system was created by Microsoft



in 1977 for storing data on floppy disks for Microsoft Stand-alone Disk Basic. The FAT16 system was later used with hard disks under DOS, Windows 3.x and all versions of Windows 95 prior to OSR2. Other operating systems, such as Windows NT and Mac OS, can also read FAT16 data. FAT16 doesn't store data very efficiently and it only allows you to create partitions of up to 2G. It was forced to adapt to accommodate larger and larger drives, but eventually drives reached a capacity that rendered FAT16 unworkable and the FAT32 system replaced it.

Windows 95 OSR2 was the first release of Windows 95 to offer FAT32. Windows 98 gave you the option of converting your FAT16 partitions to FAT32. The two main advantages of the FAT32 system are that it allows you to create partitions up to 2,048G in size, and it allows you to use smaller clusters, so you can allocate disk space more efficiently.

To understand why FAT16 can only support partitions of 2G or less requires a little mathematics; this is the area where the '16' in FAT16 becomes more relevant.

A 16-bit file allocation table can only provide 65,536 (64K) distinct 16-bit numbers. That means that there will always be a maximum of 65,536 units of storage allocation, or as they're more commonly known, clusters. Clusters are made up of groups of sectors and are the basic unit of storage for data stored on a drive.

For a hard disk formatted with FAT16, cluster sizes are always a power of two kilobytes — 2K, 4K, 8K, 16K, up to 32K. So, if you use the maximum cluster size, 32K,

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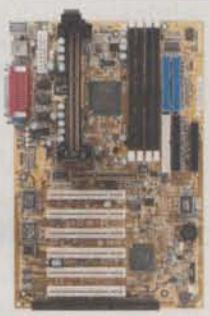
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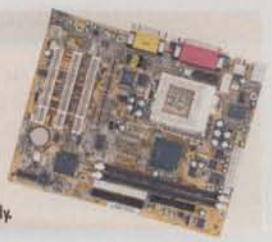
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and multiply it by 64K you get 2,048M or 2G. If you used FAT16 on a drive larger than 2G and didn't bother dividing it into several 2G partitions, you would only have 2G of available storage.

Using the 32K cluster size allows you to create larger partitions, but you will waste a lot of space storing small files (or those portions of files that don't fit neatly within a number of clusters) in each cluster. In order to store a 1K file you have to take up an entire 32K cluster. That means there is 31K of unused disk space — this is called *slack*. Take a quick scan of your Windows folder and see how many of your system files are less than 32K. The size of many files doesn't reach double figures.

With FAT16, if you want to use the most efficient cluster size of 2K, the maximum size any partition could be is 128M. To get the maximum efficiency out of a 2G hard disk using FAT16 would require 16 partitions of 128M — a cumbersome arrangement to say the least.

The size limitation and cluster waste problems go out the window with FAT32. FAT32 allows over 4 billion clusters (4,294,967,296 to be exact) — quite an increase from the 65,536 clusters allowed under FAT16. This means that you can use smaller cluster sizes and still create the large partitions required for bigger hard disks. Cluster sizes range from 4K to 32K, providing support for partition sizes from 260M to 2,048G (or 2 terabytes). However, the FAT32 converter in Windows 98 requires partitions to be larger than 512M in order to be converted.

Drives up to 8G in size are able to use 4K clusters. Considering that under FAT16 all 2G drives had to use 32K clusters, that is quite an improvement.

The FAT32 system has another advantage: it can support long filenames (LFNs). FAT16 could only accommodate filenames that conform to the 8.3 standard: eight characters separated from a three-letter file extension by a period. The three-letter extension remained much the same until the release of Windows 95, when the filename system was enhanced by the introduction of the VFAT (Virtual FAT) system that lengthened filenames to a maximum of 255 characters.

The VFAT system creates two different filenames. The first is the actual long filename; the second is its MS-DOS alias (as DOS only supports short filenames). If you have ever opened your directories from the DOS prompt you will have come across these aliases. The alias is an abbreviated form of the long filename; it's created by taking the first six characters of the long filename (minus any spaces), followed by the tilde (~), then a number, and finally the extension. If you have more than one long filename in a folder beginning with the same six letters, then the number will increment for each subsequent file. An example of all this would be when you have a long filename called Letter to Grandma.doc, the resulting alias would be LETTER~1.DOC.

FAT32 does have some limitations. It isn't compatible with any operating system other than Windows 98, the OSR2 version of Windows 95 and the latest version of NT (Windows 2000). The other disadvantage is that many disk utilities and antivirus programs will corrupt your data unless they are FAT32 compatible.

If you use Windows 98, you should convert your drives to FAT32 provided that you're not booting any alternative non-FAT32 compatible operating systems from secondary partitions on those drives. To do this, go to the Start Menu, Program Files, Accessories, System Tools, Drive Converter (FAT32). The conversion wizard allows you to select the partition you wish to convert and begin the conversion process. This process can take anywhere between 10 minutes and a couple of hours, depending on how full your drive is and the age of your system. You will be rewarded for the time you take: it's not uncommon to resurrect hundreds of megabytes of disk space, especially if the partition contains a lot of small files.

Creating and managing partitions

The new FAT32 system that comes with Windows 98 means you no longer need to create several partitions to make more efficient use of your hard disk. However, there are other reasons for creating additional partitions, such as keeping data files separate from program files or installing more than one operating system.

Partitioning is not a risk-free activity; once you delete a partition there is no simple way to retrieve the data, so you need to be confident about what you're doing before you begin. However, if you take precautions and follow the instructions correctly, you shouldn't be any more anxious about it than you would be about installing a new operating system. Be sure to make backups of all your data before doing anything.

There are a number of utilities available that allow you to create, delete and manage your partitions. Windows 98 comes with FDISK. To access this utility, click on Run in the Start menu and type FDISK. This basic utility is capable of creating and deleting partitions, but it is a better idea to purchase a third party partitioning utility such as Partition Magic (http://www.powerquest.com/partitionmagic/). Utilities like Partition Magic are easy to use and give you greater control of the partitioning process.

Kieran McNamee can be contacted at kmcnamee@acp.com.au. For a complete archive of *APC* Windows 98 columns, see http://apcmag.com/win98/.

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Delve deeper into the feature set of SSH. **By Geoffrey Bennett**

Linux

Last month you were introduced to SSH, a program that can secure communications between two machines over an untrusted network such as the Internet. You used SSH to replace Telnet and rlogin as well as the SSH agent to manage your private keys. This month we look at using SSH to replace RSH, securely copy files, forward X connections, and forward arbitrary ports.

SSH as an RSH replacement

RSH allows you to run a program on a remote host without explicitly logging in and getting a command-line prompt on the remote host. For example, the command rsh remotehost ls -la /tmp will show you a directory listing on the remote host. This facility can be very useful in scripts.

Once you have set up SSH, you can use it as a direct replacement for RSH, so the RSH example command in the previous paragraph can be replaced with ssh remotehost ls -la /tmp. Everything relating to authentication in last month's column applies here (see *APC* March, page 140). If you haven't previously logged in to remotehost with SSH it will ask whether you are sure you want to connect, and if you haven't set up some means of automatic authentication, you'll be asked for your password.

Copying files with SSH, cat and tar

Because the standard input and output of the program you run on the remote host is connected to the standard input and output on your local machine, you can use the cat program along with file redirection to copy a file from a remote host like this:

```
ssh remotehost 'cat remotefile' > localfile
```

Without adding > localfile to the end of this computer, the command would just display the remote file on your screen. Going the other way, you could copy the local file to the remote host with this command:

```
ssh remotehost 'cat > remotefile' < localfile
```

In the above examples, remotefile is relative to your home directory on remotehost. If you want to specify a different directory, you can either use a full pathname such as /tmp/remotefile or a pathname relative to your home directory such as subdir/remotefile. Be careful which way your less-than and greater-than symbols point, or you can wipe out the file you are trying to copy.

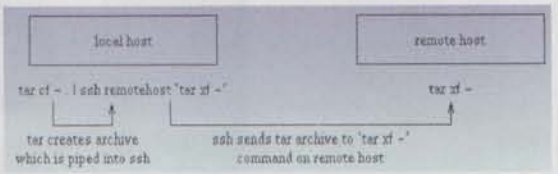


Figure 1

If you want to copy a whole directory instead of a single file, you can use tar in a similar manner to the examples above. The following command will copy everything from /home/bob on remotehost to your current directory:

```
ssh remotehost 'cd /tmp/somedirectory && tar cf - .' | tar xf -
```

You've probably seen the semicolon used as a command separator, but && can also be used to separate commands. The latter prevents the second command, tar, from running if the first command, cd, is unsuccessful. This prevents tar from copying your entire home directory if the directory you specify (/tmp/somedirectory in our example) doesn't exist or is mistyped in your command.

If you anticipate the copy will take a while, you can also use the v flag to tar (eg. cvf instead of cf) to either or both of the tar commands to view their progress.

To copy a local directory to a remote host, you can swap the commands in the pipeline around to copy the contents of your current directory to the one you specify at the remote host (/tmp/somedirectory in our example), like so:

```
tar cf - . | ssh remotehost 'cd /tmp/somedirectory && tar xf -'
```

In this case using && prevents the files from being dumped in your home directory on remotehost if the destination directory doesn't exist or is mistyped in the command line. Figure 1 shows the flow of data for the last example.

Copying files with SCP

SCP is a replacement for RCP, just as SSH is a replacement for RSH. Instead of using SSH along with cat and tar to copy files, you can use SCP which has a simpler syntax (but doesn't provide good examples of shell redirection and piping).

The command to copy localfile to remotefile on the remote host is:

```
scp localfile remotehost:remotefile
```

If you don't want to rename the file, you can leave out the filename.

```
scp localfile remotehost:
```

Or if you want to place it in a different directory, you can specify an alternative directory name.

```
scp localfile remotehost:/tmp
```

To copy the other way (from a remote host to your local host), just reverse the parameters.

```
scp remotehost:remotefile localfile
```

If you don't want to rename the file, specify a period instead of localfile.

From the above examples, you should be able to see that scp works just like the regular cp command, except you can specify files on remote hosts by putting a remotehost: before the filename.

Copying whole directories is also possible with scp. To do this, specify the -r (meaning recursive) switch. For example, the following command will create a directory called somedirectory on your local host, and fill it with the contents of /tmp/somedirectory on the remote host.

```
scp -r remotehost:/tmp/somedirectory
```

If you want the contents of /tmp/somedirectory to be placed into your current directory (rather than in a subdirectory), add an extra slash.

```
scp -r remotehost:/tmp/somedirectory/
```

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Forwarding X connections

Last month we mentioned that when you use SSH to access another machine, any X programs you run on the remote machine will be automatically forwarded over the encrypted session. X is capable of remote operation without SSH, but this suffers from the same problems as Telnet and other non-encrypted protocols. Before describing how SSH helps with this problem, we'll look at how remote operation works when SSH is not involved.

The environment variable DISPLAY is used by practically every X client to determine which X server to connect to. The format of the variable is host:display.screen; for example if it was set to green:1.0, that would mean to connect to the first screen (.0) on the second display (:1) on the server called green.

An X display refers to a keyboard /mouse/screen combination, and although it's uncommon to have more than one on the same server, it is possible. If you want to try it out, Linux's virtual consoles make it easy; try typing startx — :1 while you have an X session running. You'll then be able to switch between two completely separate X sessions by pressing Alt-Ctrl-Fn (where Fn is usually F7 or F8). You can tell which session you're looking at by typing echo $DISPLAY.

It's also possible to have more than one monitor for the same display; this is what the screen number refers to. Since most people only have one monitor attached to their computer, the .0 can be left out, so green:1 means the same thing as green:1.0.

The hostname can also be left off if you are referring to your local machine, so it's not uncommon to see the DISPLAY variable set to :0.

When you Telnet to another machine, your DISPLAY environment variable needs to be set to point back to the machine you are sitting in front of; this is usually done for you by the Telnet program. To prevent someone else connecting to your X server and running malicious programs that can disrupt your work, capture your keystrokes, or change your X server settings, there are two main security mechanisms: *host-based* and *MIT magic cookie* authorisation.

Host-based authorisation is not recommended for general use because it can only allow or disallow access based on the origin of an incoming X connection. For example, if you type xhost +remotehost, then X programs that you run on the remote host (remotehost in our examples) can connect to your display, but anybody else who is logged in to the remote host can do the same.

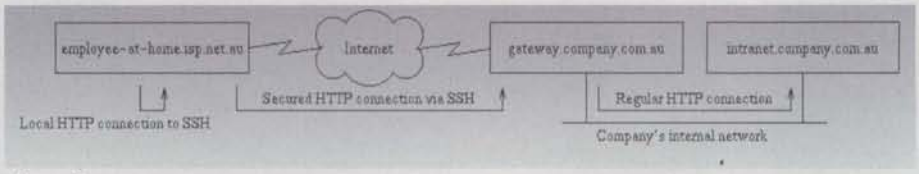


Figure 2

MIT magic cookie authorisation allows you to control access to your X server by the use of a *magic cookie*, which is a large random number that the X server keeps. Any client wishing to connect to the server needs to supply the cookie before it can have access, so by restricting who gets the cookie you can control access to the server. The main problem with this is that copying the cookies around is a hassle, and there is still the problem that the cookies are sent via unsecured paths.

The way SSH forwards X connections is to set up the remote host with a pretend X server that accepts connections and then forwards them over the encrypted connection to your local display. If you type echo $DISPLAY after connecting to a remote host with SSH, you'll notice that it is set to remotehost:10 instead of pointing back to your X server. :10 is the virtual X display that SSH has created on the remote host.

As well as automatically forwarding X connections, SSH will set up the MIT magic cookie authorisation for you, so that only you will be able to connect to the X server across the encrypted connection. In addition, it will choose a magic cookie that is different to the one used by the real X server, so that the machine that you connect to cannot connect back to your X server directly.

Forwarding arbitrary ports

Forwarding X connections is just a special case of forwarding arbitrary TCP ports (X servers listen on TCP ports beginning at 6000, depending on the display number; eg. 6005 for display number 5).

One of the more common uses of port forwarding is to gain access to a Web server that you wouldn't normally be able to access. For example, if your company runs an intranet Web server that can only be accessed from hosts on the company's internal network but there is sometimes a need to access the intranet from outside (for instance, when you are at home logged in to your ISP), SSH can provide a secure means of accessing the intranet server. To do this, you require a machine running an SSH server that is allowed to connect to the intranet server and is also capable of accepting connections from the Internet.

Figure 2 shows how such a situation would work. The command to run to produce those results would be:

```
ssh gateway.company.com.au -L
1025:intranet.company.com.au:80
```

In addition to getting a shell prompt on the gateway machine, the -L option says to forward your local port 1025 across the secure connection, and from there connect to port 80 at intranet.company.com.au. Rather than using the company Web site's regular URL (http://intranet.company.com.au/), you'd use http://127.0.0.1:1025/, which says to connect to port 1025 on your local machine. If you have a proxy server set in your Web browser, you'll probably need to configure it so that connections to 127.0.0.1 are not sent through the proxy, otherwise the proxy server will attempt to connect to its own port 1025.

The port 1025 is an arbitrarily chosen number (as long as it is not in use) you can use any port between 1024 and 65535 (the ports below 1024 are reserved for the root user).

One problem that you may find when forwarding HTTP connections is that your browser will attempt to connect to the intranet server directly if there are any Web pages on the intranet server that generate an absolute URL reference to the intranet server (eg. http://intranet/document.html) instead of a server-relative reference (eg. /document.html). If you can use SSH to connect directly to the intranet server, you can simplify the SSH command.

```
ssh intranet.company.com.au -L 1025:0:80
```

The 0 is an abbreviation of 127.0.0.1, which refers to the local host (from the point of view of the intranet server), so your local port 1025 will be forwarded to the intranet server's port 80. As mentioned last month, the -C flag to the command ssh switches compression on; this should allow large HTML files to download more quickly.

Geoffrey Bennett can be contacted at geoffrey@netcraft.com.au. For a complete archive of *APC* Linux columns, see http://apcmag.com/linux/.

Tips and tricks for accessing email on your PalmPilot. **By Ronald Rosenbaum**

PDAs

Email is no longer considered a luxury; it's become an important part of people's working lives. For many people, the idea of being able to access their email away from their desktops will definitely have some appeal.

There are two main ways to access email on the Palm: you can perform a HotSync with your desktop email program, or use a third-party add-on program and a modem to retrieve your email directly from your ISP. The latter method is fairly complicated, so an entire column will be devoted to it in a future issue of *APC*.

This month we explain how to synchronise your Palm Mail application and your desktop PC mail application, from both a remote location (by modem) and directly using your cradle. Both methods make use of your PalmPilot's built-in HotSync application.

The Palm Mail application is a powerful and versatile tool, synchronising with most popular desktop mail applications such as Outlook and Outlook Express. To get the most out of Palm Mail, you might want to make some adjustments to it before you start. By default, its mail conduit will attempt to pull down all of the mail on your PC's inbox. This may cause problems; if there are hundreds of messages in the inbox, they'll use up a considerable amount of RAM. To avoid this, run the Mail program on your Palm, tap the Menu button on the lower left corner of the silkscreen; select Options then HotSync Options. This configuration screen allows you to set criteria for filtering your mail. For example, you might choose to download unread mail only. You can filter email according to priority, sender and subject, and set a size limit on all files so that large ones are truncated and don't fill system RAM.

When you perform a HotSync your email is synchronised (typically, in both directions), not just copied. If you read a message on your PalmPilot it will also be marked read on your desktop mail program and vice versa. If you delete messages on your Palm device to save RAM, they will also be deleted on your desktop. You can move critical messages on the PC to a different folder and isolate them from the synchronisation process — this will automatically delete them from your Palm device.

You can change the HotSync settings to synchronise mail in one direction, allowing the Palm device to synchronise with the desktop, but not the reverse. This allows you to delete messages on the PalmPilot without removing them from the PC. To do this, right-click on the HotSync Manager and select the Custom menu option and you should see a list of conduits. Highlight the Mail conduit and click on the Change button. Tick the 'Desktop overwrites handheld' field and the checkbox titled 'Set as default'. This prevents accidental deletions on the Palm from affecting mail on the PC. Items that are deleted on the PC will still be removed from the Palm unless they're moved to the Filed folder on the Palm device before you HotSync.



If you want to file a message, open it then click on the Menu button, select the Message menu, then choose the File option. You'll be given the option of removing the message from the inbox. If you haven't reset your HotSync sessions so that they only synchronise in one direction, the message will be removed from both your Palm's inbox and the desktop mail inbox. To view filed messages, return to the main screen in Mail and select the Filed folder from the upper-right-hand corner of the screen.

The remote HotSync

To HotSync to your desktop PC remotely by modem instead of using the HotSync cradle, you need to dedicate a phone line to your modem's PC and some variety of modem (GSM, infra-red or Palm's proprietary modem) for your PDA. Using the HotSync program is the same whether you're using the HotSync cradle or dialling in remotely. It can synchronise your calendar, contact lists, notes, to-do list, installed application databases and email, with your desktop PIM (personal information manager; for example, Palm Desktop or Outlook) and the email package you use. If you HotSync by modem, your PC will need to remain turned on so that you can connect to it. You'll also need to set up your PC so that it automatically connects to the Internet and collects your mail periodically so that your messages are kept up to date.

To set up your PC for remote modem synchronisation, right-click on the HotSync manager and select the modem option. You also need to select the Setup menu and specify your modem type and the serial port it's attached to. If you don't know which com port your modem is using, go to the control panel on your PC and click on the Modem icon. If your modem isn't specifically listed, choose the Hayes Basic option; it will probably work. On your Palm device, run the HotSync program, select Modem Sync and choose the item that requests a phone number. If you've never used your modem before, you might want to refer to last month's column (see *APC* March, page 147) for more detailed instructions on configuring a PDA modem.

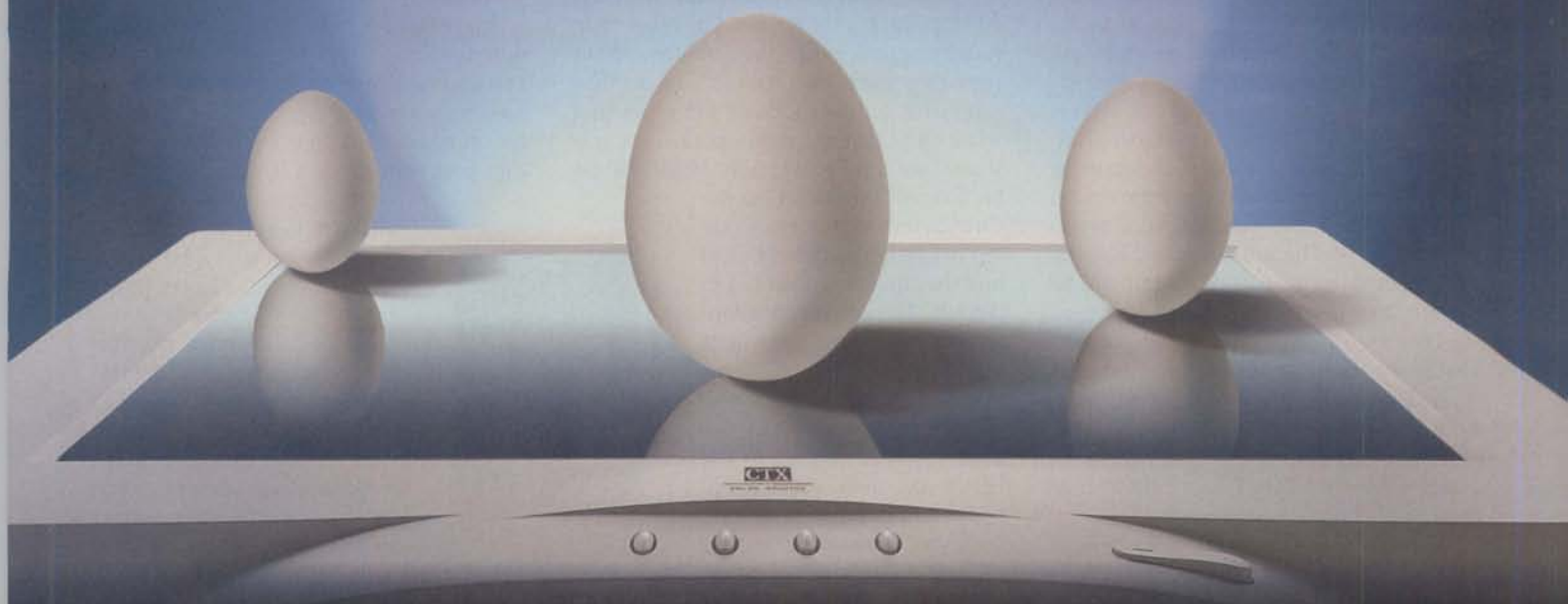
HotSync-ing over a telephone line is much slower than using your cradle. Most Palm modems are only 14.4Kbps, which is slow compared to cradle connections which are capable of reaching 57.6Kbps or 115Kbps. To speed things up, you might want to selectively trim the number of databases or applications that you synchronise during modem-based HotSyncs. Many programs (such as games and utilities) never change their data and don't need to be synchronised every time. To manually deselect these items, run the HotSync program on the Palm, click on the Menu button and select the Conduit Setup menu; you can choose which databases you want to synchronise from here.

Dialling directly to your ISP by modem requires you to install a third-party Internet mail program. The range of applications available vary from freeware programs, which will you give basic email, to advanced commercial programs, which allow you to send notes, to-do lists, appointments, contacts and Palm programs. More information on these packages will appear in a later column.

Ronald Rosenbaum can be contacted at ron@ats.au.com. For a complete archive of *APC* PDAs columns, see http://apcmag.com/pdas/.

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Frame Rate	up to 30 frames per second
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Video File Formats	avi 640 x 480 / 352 x288 / 320 x 240 / 176 x 144 / 160 x 120 pixels

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Frame Rate	up to 30 frames per second
Image File Formats	bmp / jpeg / pcx / tif / tga / ras
Video File Formats	avi640 x480 / 352 x288 /320 x 240 / 176 x 144 /160 x 120 pixels

Get the most out of Apple's new iTools service. **By Stephen Withers**

Mac OS

Apple's new iTools service comprises mac.com email addresses, an Internet filter for children, an Internet-accessible virtual disk drive and template-based Web site creation. iTools is free of charge. It's only available to users of Mac OS 9, but some of the features are accessible from older versions after you register.

To install iTools, go to http://www.apple.com/, click the iTools tab and follow the sign-up process, but read the licence agreement carefully; you may decide not to accept the agreement because the terms are too onerous. The iTools licence agreement is bulky and the acceptable use policy outlaws illegal or objectionable content or conduct; these are fairly standard terms but you might want to read the terms pertaining to the use of material stored on the iTools server with more care. Apple retain the right to showcase any material published on iTools for promotional purposes. It's a fairly benign condition, but computer professionals may want to mull over the terms more closely.

Email

When you register iTools you are provided with a mac.com email address. The mac.com mail server only accepts incoming mail; you need to use your ISP's mail server or an alternative outgoing mail server to send messages. If you use Outlook Express 5 or Netscape Communicator's Messenger for email, the iTools installer can automatically configure them to receive messages sent to your new mac.com address. Other email programs must be configured manually.

Claris Emailer users should select Accounts from the Setup menu, and click on the New button. For the service provider, select Internet then click OK. Fill in the resulting dialog box, as follows:

Account name
iTools (choose any name for the account)
User name
Leave blank
Email account
username@mail.mac.com
Email password
Your iTools password
SMTP server
The name of the SMTP server you use for outgoing mail (check with your ISP)
Email address
username@mac.com

When you've finished, click Save. To collect your mail, choose Connect Now from the Mail menu, and make sure the iTools account has a mark beside it. If you click on Connect, Emailer will fetch all your mail and place a welcome message in your iTools mailbox.

iTools holds incoming messages until you collect them, and has mail redirection and auto-answering features. Redirection is handy for redirecting mail to your ISP, and auto reply is useful when you know that you won't be checking your email for long periods (but take care to suspend any mailing list memberships before activating the latter).

KidSafe

KidSafe is Apple's answer to the problem of inappropriate Internet content. It works in conjunction with Mac OS 9's Multiple Users feature to limit access to over 55,000 approved sites. The idea is to allow educational, child-focused and child-appropriate content through rather than filtering objectionable material out. A panel of teachers and librarians in North America currently vets the list, which is apparent when you try to find Australian content. For example, a search using the word 'tigers' yields information about the animal (as you would expect) and the Detroit Tigers baseball team, but not the Richmond Tigers.

If you try to access some popular Australian sites that any reasonable person would consider acceptable for children,



you get some interesting results. Although the ABC and Seven Network sites were permitted, the AFL, Australian Open, Baggy Green (cricket), ninemsn, Network Ten and Village Roadshow sites were not. Even respected reference sites such as Encyclopaedia Britannica, Encarta and Macquarie Dictionary were blocked. Clearly, parents will need to add many URLs.

APC had a lot of trouble setting up KidSafe. Each attempt to access the KidSafe configuration page resulted in a message to reinstall iTools. A clean reinstallation of Mac OS 9, KidSafe and iTools did the trick, but iTools still had to be reinstalled a couple more times. Whether the problem was a damaged file or a software conflict remains a mystery.

Each user profile in the Multiple Users control panel receives an extra checkbox that activates KidSafe for that user (turned on by default for new users). When you log in to Mac OS as the owner, you may use the iTools site to configure KidSafe settings for users by individual or by groups. When adding URLs to the permitted lists, be sure to click on Apply at the bottom of the page or they won't be added to the user profile. You can leave a dialup connection active when logging on and off under different user profiles. This saves making an extra phone call if you need to switch profiles and take your children on a supervised visit to a site that is blocked.

iDisk

Each iTools user is allotted 20M of space on Apple's server. This doesn't sound all that generous, but it is convenient.

The volume contains five folders:
Documents is a private folder where you can stash files you would like to access from various locations. This is handy as Internet connectivity becomes ubiquitous and floppy drives less common.
Sites stores the Web pages you generate with HomePage or upload manually.
Pictures and **Movies** store digital photos and movies. This folder is used in conjunction with your iTools Web site.
Public allows you to make files accessible to other iTools users. If they know your username, they can mount your

Public folder as a volume, so only use this folder if you don't care who sees what's in it.

Once your iDisk is mounted on the desktop, give it an alias so you can mount it by double-clicking on the alias. If you have any security concerns, your iDisk is still as secure as ever; you'll be asked for your password just as you would be when opening an AppleShare or File Sharing volume.

You might find it convenient to make aliases for the public folders belonging to other users with whom you regularly swap material. If there are several, reduce clutter by keeping them in a folder that can be viewed as a pop-up window (open the folder, and select 'as Pop-up Window' from the View menu). Alternatively, use OneClick's Launch Strip or another Launcher-style utility to keep things tidy. Either way, custom icons on each alias will allow you to distinguish them easily.

iDisk is nominally for Mac OS 9 only, but if you manually install the AppleShare and DHX UAM (user authentication method) files from AppleShare Client 3.8.3 on any Mac OS after version 7.5.3, it will work (the FTP site can be accessed from a link on **apcmag.cd** under Mac OS shareware). Mount the disk image, drag AppleShare to the Extensions folder, and put DHX inside the AppleShare Folder (create it, if necessary) within the Extensions folder.

After installing iDisk and restarting your system, open the Chooser, click on AppleShare, then Server IP Address. Type in idisk.mac.com and enter your iTools username and password in the dialog box that appears. You then need to confirm the volume you are mounting. Your Mac may seem unresponsive during this process, but give it time and don't be too quick to assume it has frozen. For more information on using iTools with older systems, visit Roland Gustafsson's Web site (http://www.acts.org/itoolstrick/).

HomePage

HomePage allows you to build a basic Web site with minimum effort, but the range of templates available is very limited. At the time of writing, there were only five categories: photo album, movie album, invitations, baby announcements and résumé.

If you have copied photo or movie files into the appropriate folders of your iDisk, HomePage can automatically build pages around them. You only need to add a page title and a description of the photos. Regardless of the template, all editing is done through your browser.

If you already have a Web site, it's easy to make your iTools account point to it. Create a start page in iTools. It doesn't matter which template you use — it is only going to be a placeholder, so don't bother editing it.

Use SimpleText or another text editor to create an HTML file like this:

```
<html>
<head>
<title> </title>
<base target="_top">
<META HTTP-EQUIV="refresh"
CONTENT="0; URL=http://apcmag.com/">
</head>
<body>
Please wait . . . redirecting
</body>
</html>
```

Replace http://apcmag.com/ with the URL of your own site. Save the file on your hard disk as redirect.html. Next, open your iDisk and copy the file into the Sites folder. Open the Sites folder and you will see three files: index.html, redirect.html and a third that will be named according to the template you chose (for example, invite.html). Delete this last file by dragging it into the trash, then rename redirect.html as whatever it was called.

iCards

While anyone can send an iCard (click the iCards tab at the top of the Apple home page or any other Apple page that displays the navigation bar), only registered iTools users can create iCards with their own pictures. Any JPEG in the Pictures folder of your iDisk can be turned into an iCard, but it's best to keep the card's file size and dimensions reasonably small. The picture will be scaled before sending, and the resulting file is typically only 20K to 40K, so people are unlikely to object to the size.

Security

iTools raises some security issues. Brad Pettit (http://bradpettit.edithispage.com/) drew the Macintosh community's notice to the fact that the user's password is among the data sent from the server to the iTools plug-in, in plaintext. That should only happen once during the sign-up process, but it is resent each time the user reinstalls iTools on another computer, or reinstalls following the installation of a new browser or software errors. If you connect to the Internet over a LAN and someone is using a packet sniffer, you're digitally naked.

Pettit also noted that the iTools plug-in is capable of gathering machine-specific information, including your NIC's Ethernet address, which identifies the exact computer being used. He also warns that in theory, the plug-in is capable of being controlled from sites other than Apple's.

Disable the plug-in when you're not using it until more is known about the security implications. Be aware that the iTools Installer places the plug-in in the appropriate folder for every copy of Netscape and Internet Explorer it finds on every mounted volume, whether local or remote.

Stephen Withers can be contacted at swithers@ozemail.com.au. For a complete archive of *APC* Mac OS columns, see http://apcmag.com/mac/.

Mac OS shareware

Greg's Browser 2.6.1

Greg's Browser provides a columnar view of your hard disk's contents — a popular alternative to normal Finder views.

CopyPaste 4.4

CopyPaste provides sets of up to 10 editable clipboards, and can save clip sets for future use.

Prestissimo 1.5.1

Prestissimo provides comprehensive control over the appearance and function of the Application Menu palette.

TechTool 1.1.9

A competent tool for accomplishing thorough desktop rebuilds. It zaps PRAM without losing useful information.

FinderPop 1.8.4

FinderPop avoids the need to use the Ctrl key to access Context Menus, and provides a hierarchical menu showing the contents of any folder you click on.

All these packages can be found on this month's apcmag.cd, along with more detailed reviews.

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Should you make the switch to HPFS?

By Christopher Relf

OS/2 Warp

It is one of the top 10 features of OS/2, but HPFS (High Performance File System) is often misunderstood and definitely under-utilised. Although it made its first appearance in 1989, many users are still uncertain about what it can and cannot do.

Where does it come from?

Originally co-developed by IBM and Microsoft (hear Bill Gates' thoughts on OS/2 on this month's **apcmag.cd**), OS/2 was borne out of a need to replace Microsoft's Disk Operating System (DOS) with an operating system that could, among other things, multitask.

A huge advance to come from the development of OS/2 was the implementation of a new file system. In an OS/2 ezine article, Heath Phillippi described the development of HPFS this way: "OS/2 was created as the next step after DOS. The original designers sat down and found all the faults and weaknesses in DOS, then looked at ways to improve these. One of the best results of this was HPFS. HPFS was built, from the ground up, with the speed and stability of large hard disks in mind." (Read the full transcript at http://www.os2ezine.com/v1n2/hpfs-fat.html.)

IBM and Microsoft designers created the first version of a very stable and usable file system that is still in use 12 years later. There is a highly readable article on the file system's development entitled 'Design goals and implementation of the new High Performance File System' in the *Microsoft Systems Journal* (September 1989). You can find a copy of the article online at http://www.lionsgate.com/home/baden/public_html_index/hpfs.txt.

What is HPFS?

File systems define how and where data is written to and read from data storage media — including floppy disks, hard drives and CD-ROMs. The file system used under DOS is called FAT (file allocation table) — FAT16 or FAT32 depending on which generation of FAT you're referring to. FAT relies on third-party utilities to survive; without them it is very slow and would be considered unusable by today's standards. By contrast, HPFS is an installable file system, just like a CD-ROM file system — it has a driver that loads and enables OS/2 to read and write to HPFS volumes. Because HPFS is installable, it has many built-in features, including resistance to fragmentation, built-in caching, long filenames support, enhanced extended attribute support and a Hot Fix feature.

Resistance to fragmentation

Phillippi writes, "Suppose you have a file cabinet with no labels on the drawers. When you create a new file, you stick it at the end of the last drawer. If you have to add to an old file, you stick a note to the original file telling it where to look for the rest of the file. Whenever you need a file, you start looking in the top drawer and keep looking, top down, until you find it. This is how FAT stores and finds files. While this may be alright for one or two drawers, what happens when you get four or eight? Or a hundred?" What happens when you need to add more to a file that already exists in two sections?

With HPFS, newly created files are scattered across the disk in separate bands, so that those sectors are allocated to the files as they are extended, making it harder for files to interleave.

HPFS also pre-allocates about 4K of contiguous space to a file each time it is opened, in case it needs to be extended, and gives back any excess when the file is closed. This strategy is especially important for dealing with a large number of open files simultaneously. If an application knows the ultimate size of a new file in advance, it can specify an initial file allocation when it creates the file. HPFS then searches all the free space chunks for a run of consecutive sectors large enough to hold the file. If that fails, it searches for two runs that are half the file size, and so on until an appropriate storage space is found.

Next month's column will look at more of the superior features of HPFS.

Christopher Relf can be contacted at Christopher.Relf@start.com.au. For a complete archive of *APC* OS/2 columns, see http://apcmag.com/os2/.

HPFS and other operating systems

Don't be frightened off using HPFS on an operating system that doesn't support it by default. For information about using HPFS with other operating systems, see the links at http://www.penguin.cz/~mhi/fs/Filesystems-HOWTO/Filesystems-HOWTO-4.html. There are several HPFS drivers included on **apcmag.cd**.

OS/2 shareware

PMView 2000
A robust general-purpose graphics viewing and manipulation utility.

Albatros Media Player 2.0b6
This media player will play almost everything directly supported by MMPM/2, MOD and audio MPEG files.

QuickMotion 2.0
QuickMotion extends OS/2's MMPM/2 to support 12 types of QuickTime, QT-VR, QT-MIDI and Windows-style AVI movies.

aMixer 1.9a
If you want to tweak your sound output a fraction more, Mixer is more than adequate for the job.

SOX 12.15
SOX is the Swiss Army knife of sound processing tools. It converts sound files between a wide range of formats.

All these packages can be found on this month's apcmag.cd, along with more detailed reviews.

Templates will save you more time and energy than all the whitegoods sold in the '50s combined. **By Michael Smith**

Simple C++

IT pundits have a wearying habit of pronouncing that every new piece of technology is going to revolutionise the whole industry; this is rarely the case. 'Groundbreaking' is an horrendously overused term. It seems to be used to describe every new technology product, but more often than not you find that it's a just a recycled version of an old technology. No wonder you tend to become a little jaded. However, every now and then we encounter something that makes us sit back and say 'that's neat!'. The introduction of templates in C++ was just such an occasion.

Why use templates?

Used judiciously, templates can save you a lot of time and energy — and isn't that what a good piece of technology is supposed to do?

Consider listing 1. The function max() is a common and useful function. It finds the biggest of two objects. Overloading allows you to create many different versions of max, so you can implement it for just about any type of object.

There are two problems with this. First, there's a load of duplication. If you find a bug, you have to fix it in several places. Second, if you create a new type of object then you have to implement a max function for it (the eyelids become heavy just thinking about it). This is a situation where templates can really shine.

Listing 2 is a template for a max function. The template is built around a generic class, T. T can be an int, a double or any standard data type. It can also be any user defined class, so long as the class supports the > operator. When the program is compiled, the appropriate data type will be substituted for T; the whole thing works seamlessly. If you call max(1,3), T will become an int. Alternatively, for max(4.3,8.9), T will be a double. If you mix arguments, such as max(3,5.2), the compiler will try to promote one type to make the two arguments the same. In this case, the integer 3 will be promoted to a double 3.0 and the double version of max() will be called.

Using this technique, you can create templates for any common algorithm and reuse it for a variety of data types. Listing 3 is a standard insertion sort algorithm, adapted from Robert Sedgewick's *Algorithms in C++* (Pearson Education, 1992), while listing 4 shows a template for the same algorithm. It's nice when technology actually saves you effort.

Stacks

A *stack* is a common method used for managing data. The best way to visualise a stack is to think about a stack of plates in a cafeteria. Each diner takes a plate from the top of the stack, and as each plate is washed up it is put back on top of the stack. Nobody takes plates from the middle or the bottom; all input and output is done via the top. Chances are that the plate at the bottom of the stack will never be used.

A stack data structure is similar. You can push data onto the top of the stack, or pop data off. The last data element added to the stack will also be the first to be removed. This is sometimes known by the acronym LIFO (last in, first out).

A stack can be a good way to manage data, so long as you're not too concerned about the order in which the data is processed. If you need to process the data in the order it's received, you might need something like a queue.

A queue data structure works like a queue at the local cinema. Whoever arrives first will be the first in to the theatre. If there aren't enough seats, the last to arrive will miss out. This is known as FIFO (first in, first out).

Templates for classes

Impressive as you may have found them thus far, templates only get better. You can also make templates for classes. Do you remember our CStack class from December Simple C++ (see *APC* December 1999, page 165)? If not, have a quick glance at listing 5, which contains the class declaration. The CStack class is a simple stack implementation for integers. It supports a *push* operation (pushing data onto the top of the stack) and a *pop* operation (popping data off the top of the stack). This class is a perfect candidate for conversion into a template. Listing 6 shows a template implementation.

Our TStack class template allows you to manage any type of data. When you utilise the class template (as in listing 7), you supply the appropriate data type. Where you instantiate the CStack class as CStack s(50), you instantiate the template class as TStack<int> s(50), telling the compiler that s is a stack of ints. Again, this allows you to recycle substantial amounts of code.

A template class for managing data, such as our stack, is often known as a *container class*. The C++ standard library includes a number of interesting container classes, and some of them will be looked at in next month's column. Until then, keep on coding.

Michael Smith can be contacted at emmenjay@zip.com.au. For a complete archive of *APC* Simple C++ columns, see http://www.apcmag.com/simplec/.

C++ source code

Listing 1

```
int max( int a, int b )
{
  if (a>b)
    return a;
  else
    return b;
}
double max( double a,
            double b )
{
  if (a>b)
    return a;
  else
    return b;
}
unsigned long max(
          unsigned long a,
          unsigned long b )
{
  if (a>b)
    return a;
  else
    return b;
}
```

Listing 2

```
template <class T>
T max( const T &a,
       const T &b )
{
  if (a>b)
    return a;
  else
    return b;
}
```

Listing 3

```
void Sort( int data[],
           int NumData )
{
  int i;
  for (i=1; i<NumData; i++){
    int tmp = data[i];
    int j=i;
    while (j>0 &&
           data[j-1]>tmp) {
      data[j] = data[j-1];
      -j;
    }
    data[j] = tmp;
  }
}
```

Listing 4

```
template <class T>
void Sort( T data[],
           int NumData )
{
  int i;
  for (i=1; i<NumData; i++){
    T tmp = data[i];
    int j=i;
    while (j>0 &&
           data[j-1]>tmp) {
      data[j] = data[j-1];
      -j;
    }
    data[j] = tmp;
  }
}
```

Listing 5: cstack.h

```
class CStack {
public:
  CStack( int size=1000 );
  ~CStack( void );
  bool Push( int val );
  bool Pop( int &val );
private:
  int *buff;
  int count;
  int buffsize;
  bool Expand( int size );
};
```

Listing 6: tstack.h

```
template <class T>
class TStack {
public:
  TStack( int size=1000 );
  ~TStack( void );
  bool Push( T &val );
  bool Pop( T &val );
private:
  T *buff;
  int count;
  int buffsize;
  bool Expand( int size );
};

template <class T>
TStack<T>::TStack( int size )
{
  count = buffsize = 0;
  buff = 0;
  Expand( size );
}

template <class T>
TStack<T>::~TStack( void )
{
  delete [] buff;
}

template <class T>
bool TStack<T>::Push( T& val )
{
  if (count==buffsize)
    if (!Expand(2*buffsize))
      return false;
  buff[count++] = val;
  return true;
}

template <class T>
bool TStack<T>::Pop( T &val )
{
  if (count) {
    val = buff[--count];
    return true;
  } else {
    return false;
  }
}

template <class T>
bool TStack<T>::Expand(int size)
{
  int i;
  T *tmp = (T *)new T [size];
  if (!tmp)
    return false;
  if (count>size)
    count = size;
  if (buff) {
    for (i=0; i<count; i++)
      tmp[i] = buff[i];
    delete [] buff;
  }
  buff = tmp;
  buffsize = size;
  return true;
}
```

Listing 7: TStack.cpp

```
#include <iostream>
#include "tstack.h"
using namespace std;

int main()
{
  TStack<int> s(50);
  int val;

  do {
    cin > val;
    s.Push( val );
  } while (val!=0);

  while (s.Pop( val ))
    cout << val << '\n';
  return 0;
}
```

These listings can be found on this month's apcmag.cd

Delve into Java graphics programming and complex geometric shapes. **By David Williams**

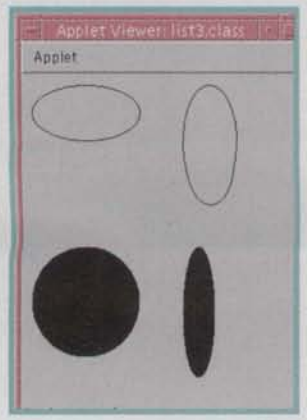
Java

Previously, this column has explored Java's graphic primitives. In addition to using components like buttons and checkboxes, Java allows you to draw directly onto the pixels of a window.

This month you will go beyond lines, rectangles, ovals, polygons and arcs, and learn about some more complex shapes.

First, in addition to the plain and rounded-edge rectangles that you've drawn, Java provides methods for creating bevelled rectangles. These are called 3D rectangles, but they aren't 3D in the sense that they holographically leap out of the screen. Rather, they appear to be raised or indented, depending on the parameters you provide.

In listing 1 there is a simple applet that draws four 3D rectangles. You use the draw3DRect and fill3DRect methods to make them. As you can see, the applet passes precisely the same parameters as when drawing a rectangle (namely, the corner coordinates), but with an extra parameter. If this parameter is true, the rectangle is drawn raised from the window; if false, it is recessed into the window. Listing 2 is the HTML file needed to invoke this. To view, open list2.html in a Java-enabled Web browser or use the Applet viewer in the usual manner.



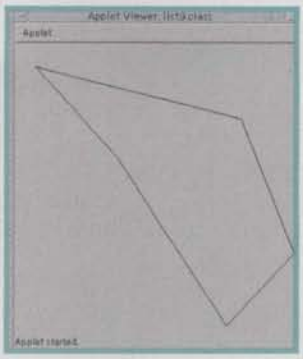
Remember, you draw your graphics using a java.awt.Graphic object, which is passed in to the applet's paint method as a parameter. Also, keep in mind that you should always call the paint method of the class you have inherited from — in this case, the base Applet class itself. This is achieved in the last line of your paint method with a call to the superclass.

Ovals and polygons

Ovals are just as easy to use as plain rectangles. In fact, when you draw an oval in Java, you start by defining a rectangle in which the oval will appear, so the parameters are exactly the same as with drawRect and fillRect: the X and Y coordinate of the upper-left corner, and the width and height. If you use the same value for the height and the width, then you will draw a circle.

Listing 3 shows some ovals, and listing 4 contains the HTML code to run this applet.

In addition to basic lines, rectangles and ovals, you can create polygons. Polygons can have any number of sides. Each side is specified as a pair of X and Y coordinates. The last coordinate joins back up to the first coordinate to complete the shape.



In usual fashion, you can use the drawPolygon and fillPolygon methods to make your polygons. As a polygon could have any number of sides, how do you specify all the coordinates to Java? Perhaps you could have methods that take any number of parameters, from six up to some large number, but you would have to define an awful lot of methods, and what if somebody needs a polygon with just two more coordinates than you've allowed for?

To avoid these problems, Java provides two ways to create polygons. You can either provide an array of X and Y coordinates or you can repeatedly add points to a Polygon object. Let's look at both methods.

The first way to create a polygon is to instantiate a java.awt.Polygon object. Because you usually import java.awt.* you can refer to the object as just Polygon. So, in listing 5 you have the following:

```
Polygon p = new Polygon();
```

This creates an empty polygon. You fill this with X and Y coordinates, using an addPoint() method, available from the Polygon object. As shown in the listing, you then keep calling addPoint to add more and more points, like so:

```
p.addPoint (30, 30);
```

You can call this method as many times as you like, to add more and more vertices to your polygon. Finally, use the drawPolygon method of your Graphics object, passing the Polygon object you've made as a parameter. This then draws the polygon with as many sides as you've defined.

This is a relatively easy way to deal with polygons. However, there is another way. The second method is to make an array of X coordinates and an array of Y coordinates. So, instead of creating a Polygon object and adding points one at a time, you can create a polygon with all its points right from the start. Hence, in listing 7 you have:

```
static int X[] = {30, 145, 300, 395, 320};
static int Y[] = {30, 152, 384, 284, 100};
Polygon p = new Polygon(X, Y, X.length);
```

Note that three parameters are used in the Polygon constructor: the X coordinate array, the Y coordinate array, and an integer value indicating the number of points you've given. Using X.length passes in the length of, or number of elements in, the X array. You can now pass this new polygon to the fillPolygon or drawPolygon method as before.

It's not necessary to create a Polygon object first. You can supply an array of X and Y coordinates, and the total number of points to connect, straight to the drawPolygon or fillPolygon methods. So, in listing 9 you have:

```
g.drawPolygon (X, Y, X.length);
```

In this case, you are not instantiating a Polygon object. Instead, you are directly providing all the essential information straight to drawPolygon.

That's it for polygons. Remember, you can have any number of points for your polygon. They can be very simple, or incredibly complex, depending on what you have in mind.

David Williams can be contacted at dave@qed.newcastle.edu.au. For a complete archive of *APC* Java columns, see http://apcmag.com/java/.

Java source code

Listing 1

```
import java.applet.*;
import java.awt.*;

public class list1 extends
Applet
{
  public void paint (Graphics
g)
  {
    g.draw3DRect (10, 10, 100,
100, false);
    g.draw3DRect (150, 10,
100, 100, true);

    g.fill3DRect (10, 150,
100, 100, false);
    g.fill3DRect (150, 150,
100, 100, true);

    super.paint (g);
  }
}
```

Listing 2

```
<html><head>
<title>3D Rectangles</title>
</head>

<body>
<applet code="list1.class"
width="400"
height="400"></applet>
</body></html>
```

Listing 3

```
import java.applet.*;
import java.awt.*;

public class list3 extends
Applet
{
  public void paint (Graphics
g)
  {
    g.drawOval (10, 10, 100,
50);
    g.drawOval (150, 10, 50,
100);
    g.fillOval (10, 150, 100,
100);
    g.fillOval (150, 150, 30,
120);

    super.paint (g);
  }
}
```

Listing 4

```
<html><head>
<title>Ovals</title>
</head>

<body>
<applet code="list3.class"
width="400"
height="400"></applet>
</body></html>
```

Listing 5

```
import java.applet.*;
import java.awt.*;

public class list5 extends
Applet
{
  public void paint (Graphics
g)
  {
    Polygon p = new Polygon();
    p.addPoint (30, 30);
    p.addPoint (145, 152);
    p.addPoint (300, 384);
    p.addPoint (395, 284);
    p.addPoint (320, 100);
    g.drawPolygon (p);

    super.paint (g);
  }
}
```

Listing 6

```
<html><head>
<title>Polygons</title>
</head>

<body>
<applet code="list5.class"
width="400"
height="400"></applet>
</body></html>
```

Listing 7

```
import java.applet.*;
import java.awt.*;

public class list7 extends
Applet
{
  static int X[] = {30, 145,
300, 395, 320};
  static int Y[] = {30, 152,
384, 284, 100};

  public void paint (Graphics
g)
  {
    Polygon p = new Polygon(X,
Y, X.length);
    g.drawPolygon (p);

    super.paint (g);
  }
}
```

Listing 8

```
<html><head>
<title>Polygons</title>
</head>

<body>
<applet code="list7.class"
width="400"
height="400"></applet>
</body></html>
```

Listing 9

```
import java.applet.*;
import java.awt.*;

public class list9 extends
Applet
{
  static int X[] = {30, 145,
300, 395, 320};
  static int Y[] = {30, 152,
384, 284, 100};

  public void paint (Graphics
g)
  {
    g.drawPolygon (X, Y,
X.length);
    super.paint (g);
  }
}
```

Listing 10

```
<html><head>
<title>Polygons</title>
</head>

<body>
<applet code="list9.class"
width="400"
height="400"></applet>
</body></html>
```

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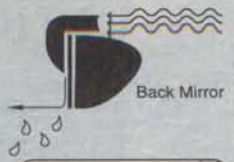
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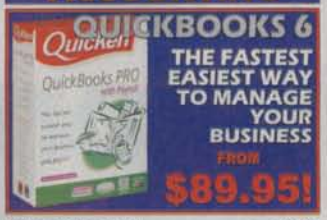
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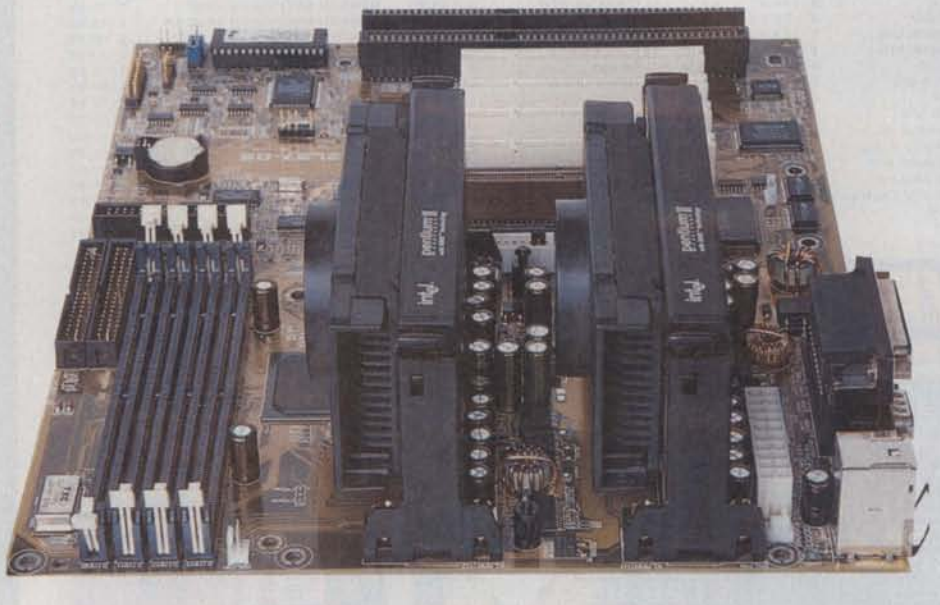
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ED PowerQuest Lost & Found	49
ED Visio 2000 Standard	169

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CC-16Y	BCI-3Y	BJC-6000 Yellow	$16.00
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CE-56PBK	SO20093	STYLUS Colour 400/500/600/Photo Black	$17.00
CE-57CL	SO20097	STYLUS Colour 200/500 3-Colour	$23.00
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CANON BJ-300/ 330	7	4-BKL
CANON BJC-600/610/620	16	5-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	45	19-BKL
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BC-20	9	18-BKL
CANON BJC-6000	6	46-BKL
HP Desk Jet 400/500 Series	6	8A-BKL
HP Desk Jet 600/660/690 Series	6	8B-BKL
HP Desk Jet 700/850C/855C/870C/890C/1000C Series	6	29-BKL
HP Deskjet 300 Series & Olivetti JP's!	8	7-BKL
EPSON Stylus 400/800/800+/1000	8	1-BKL
EPSON Stylus Colour /PRO/XL	8	2-BKL
EPSON Stylus 820/colour II/IIs	12	23-BKL
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	12	33A-BKL
EPSON Stylus Colour 440/460/640/660/700/740/760/900	12	33B-BKL
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series	6	35A-BKL
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CANON, EPSON, HP Fluorescent & Photo Realistic Kits!	12	Please Call!

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CANON BJC-600/610/620	3x8	10-CLR
CANON BJC-2000/4000/4100/4200/4300/4550/5000/5500 BCI-21	3x30	17-CLR
CANON BJC-6000	3x4	47-CLR
HP Colour Desk Jet 300/400/500 Series & Olivetti!	3x12	14A-CLR
HP Colour Desk Jet 600C/660C/690C Series	3x12	14B-CLR
HP Desk Jet 850C/855C/870C/1000C Series	3x3	30A-CLR
HP Desk Jet 710/720/890 Series	3x3	30B-CLR
EPSON Stylus Colour /PRO/XL	3x4	16-CLR
EPSON Stylus 820/colour II/IIs	3x12	24-CLR
EPSON Stylus Colour 200/300/400/500/600/800/850/1520	3x12	34A-CLR
EPSON Stylus Colour 440/460/640/660/700/740/760/900	3x12	34B-CLR
IBM/LEXMARK 4076/1000/1020/2000/2030/2050 Series	3x6	36A-CLR
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Microtek X6 A4 USB	$338

MODEMS

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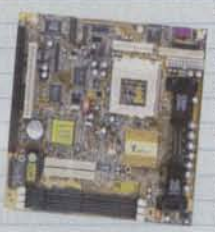
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APC Smart-UPS 620	$608
APC Smart-UPS 700	$809
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8955221/1999333	Kodak DC240 Megapixel Digital Camera with 8Mb Card	958.85	819.46
1153899	Kodak DC265 Megapixel Digital Camera with 16Mb Card	1624.26	1390.03
8550212	Kodak DC280 2millionpixel USB/Serial Digital Camera with 20Mb Card	1321.92	1131.84
1720358	Kodak DVC325 Colour Digital Multimedia Camera	157.53	134.56
8994857	Kodak DC290 3million pixel Digital Camera	1603.48	1363.50
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8216822	Kodak 4MB Picture Card	58.86	50.11
8633828	Kodak 10Mb Picture Card	110.47	94.05
8492399	Kodak 10MB Picture Card plus adaptor	113.41	96.55
8242026	Kodak 20MB Picture Card + Adaptor	137.82	117.33
1964840	Kodak 32MB Picture Card + Adaptor	198.80	168.00
1877919	Kodak 48MB Picture Card + Adaptor	261.28	220.80
1404169	Kodak 64MB Picture Card	278.48	232.80
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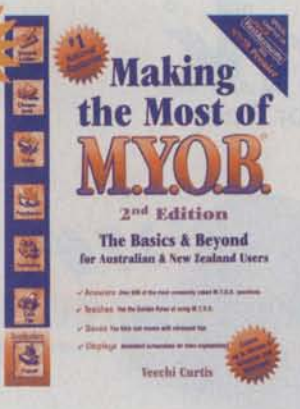
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AUA08	USB Header Card 2xType A f Connectors 8pin		16.70	15.75
AUA01	USB A male - A male	1m	7.95	7.30
AUA02	USB A male - A male	2m	9.80	9.05
AUA03	USB A male - A male	3m	11.50	10.60
AUA04	USB A male - A male	5m	15.55	14.35
AUA10	USB A male to B male	1m	7.95	7.30
AUA11	USB A male to B male	2m	9.80	9.05
AUA12	USB A male to B male	3m	11.50	10.60
AUA13	USB A male to B male	5m	15.55	14.35
AUA14	USB Adaptor A female - A female		12.00	11.05
AUA15	USB Adaptor A female - B female		12.00	11.05
AUA16	USB Adaptor B female - B female		19.90	18.35
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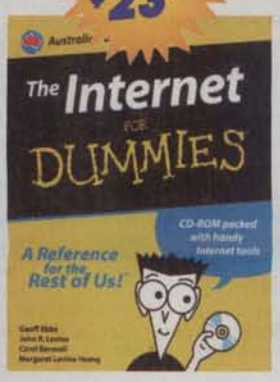
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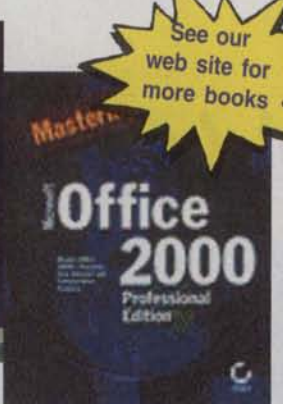
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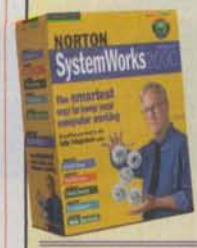




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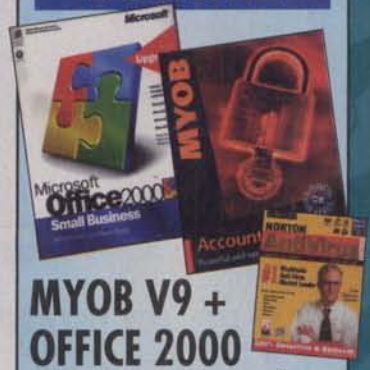
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K12BK	50	K5CLR	30
K12BK	6/9	K5CLR	30
K27BK	6	K5CLR	30
K28BK	12	K35CLR	6
		K36CLR	6
K19BK	2	K24CLR	6
		K15CLR	6
K13BK	12	K20CLR	6/12
K16BK	12	K7CLR	6/12
K14BK	12	K6CLR	12
K15BK	8	K6CLR	6
K17BK	12	K20CLR	6/12
K17BK	12	K8CLR	6
K17BK	12	K17CLR	6/12
K21BK	3	K34CLR	3
K26BK	12	K16CLR	6/12
K6BK	12	K16CLR	6/12
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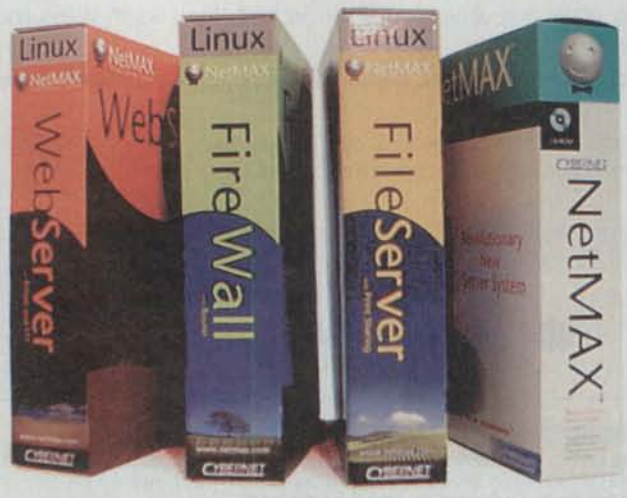
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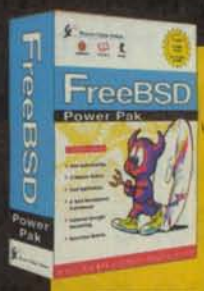
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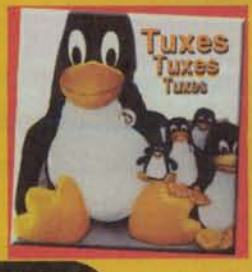
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HP Deskjet 800 Series/1600c	51641A	3x6	11XX
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Epson Stylus Colour/Pro/XL	SO20036/66	3x8/2	21XX
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CANON BJC600/610/620	15	C5
CANON BJC4000/4100 /4200/4550 BCI-21/20	50/8	C8
CANON BJC 6000	4	C19
CANON BJC 7000	12	C15
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HP DESKJET 820C/850C/855C/870C/1000C	6	H6
HP DESKJET 720/890/Officejet 1150	6	H13
HP DESKJET 1200 B, Y, C, M	6	H8
EPSON STYLUS COLOUR 750/900/1200	12	E#
EPSON STYLUS 400/800/1000	8	E1
EPSON STYLUS COLOUR / PRO / XL	6	E2
EPSON STYLUS 820 / COLOUR 11/11S/200	12	E4
EPSON COLOUR 400/500/600/700/Photo Ex	12	E7
EPSON COLOUR 440/640/740/800/850/1520	12	E7
EPSON STYLUS COLOUR 750/900/1200	12	E14
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CANON BJC4000/4100/4200/4550 BCI-21	30	C9
CANON BJC 7000	6	C16
HP DESKJET 400, 500 & 600 SERIES	12	H3/H5
HP DESKJET 820C/850C/855C/870C/1000C	6	H7
HP DESKJET 720/890/Officejet 1150	4	H14
EPSON STYLUS COLOUR / PRO / XL	6	E3
EPSON STYLUS 820/COLOUR/11/11S	12	E5
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They simply 'gave the books to their accountant to sort out' once each year!

The need to keep track of the GST will change that situation for many investors and people in small businesses. For many there will be a need to remit monies to the tax office on a regular basis, and to make claims for rebates on GST.

You could try to work your GST out manually with a calculator, but it will be a lot easier to track with an accounting package suited to Australian conditions, with upgrades being made available to suit the latest rules of the evolving GST.

Special Pricing for Quicken PRO on IBM, Acer, Compaq PCs and Free with HP

Check out the PCs and notebook computers on pages 4, 5 and 6. With the Acer, Compaq, and IBM PCs we are able to offer you a special price on **QuickBooks PRO** if you purchase with any of the products listed.

Note that with the Hewlett Packard systems on page 7 the **QuickBooks PRO** is provided FREE. This is a fantastic offer from Hewlett Packard! You will be able to get your new computer and GST compliant software in time to set it up and learn the software prior to the introduction of GST on July 1st.



Quicken have 1050 trainers around Australia, and 450 who can help you set up a point-of-sale cash drawer system.
Contact us for details or check our web site **www.ht.com.au/cat/quicken**

- QUICKEN - **QuickBooks PRO V7**: GST-guaranteed by Quicken, single user, wide range of features. See page 8 of this publication or our web site for more details. **$328**
- QUICKEN - **QuickBooks PRO V7, 5-User**: Same product as above but network-ready and licenced for up to 5-users. See page 8 for web-link. **$737**
- MYOB - **MYOB V9 Accounting for Windows:** GST Ready for more details see out web site at www.ht..com.au/cat/myob. HT part No 85771 **$359**
- MICROSOFT + MYOB - **Microsoft Office Small Business Edition + MYOB**, See page 64 for more details. **Upgrade $499, Full version $639**

You can use your $200 GST Start-up Assistance Voucher when buying the above software



Harris Technology@Kmart, Broadway (Sydney)



APR 3

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Do you want Fly Buys with that?

Acer

Web Direct www.ht.com.au/cat/acer

ACER + Quicken = GST Ready

intel inside pentium III



QuickBooks PRO

$199

When purchased with an Acer system. **QuickBooks** invoices, tracks unpaid bills, calculates charges on overdue payments, shows users what they owe, and more. See Web Direct for more info

Are you GST ready?

A quality system, with a GST-ready accounting package from Quicken. Check page 8 for more information on GST-ready Quicken and QuickBooks software.

You may be entitled to the GST Direct Assistance Rebate of $200.

See Page 2 for details

AcerPower S Series

Includes Acer 15" CRT monitor, Speakers, integrated UMA 8MB VGA (AcerPower Se)/ 8MB ATi Xpert RagePro TURBO 3D graphics accelerator (AcerPower Sn) 16-bit sound, Microtower & PC-Cillin Anti-Virus



	AcerPower SE	AcerPower SN	AcerPower SN	AcerPower SN
CPU	Intel Celeron 500MHz	Intel Pentium III 500MHz	Intel Pentium III 550MHz	Intel Pentium III 650MHz
RAM	64MB PC-100	64MB PC-100	64MB PC-100	128MB PC-100
HDD	10GB	10GB	10GB	15Gb
CD/LAN	CD/LAN	CD/LAN	CD/LAN	DVD/LAN
OS	Win98 Second Edition	Win98 Second Edition	Win98 Second Edition	Win98 Second Edition
Part #	(92932)	(92933)	(92934)	(92937)
RentSmart*	20.53 / Week	21.69 / Week	$18.00 / Week	$25.38 / Week
Price	**$1,899**	**$1,999**	**$2,122**	**$2,999**

Powerful AcerAspire Desktops



All Aspires come with the following fantastic software:

- ★ World Book Multimedia Encyclopaedia 99
- ★ Hasbro 3 game CD: Sorry!, Yahtzee, Smart Games Challenge II
- ★ Aspire time Machine System recovery
- ★ MS Windows 98SE/I.E.5.0
- ★ Microsoft Works 4.5
- ★ Hasbro Interactive Battleship
- ★ KidDesk Internet Safe
- ★ Acer Computer Explorer
- ★ PC-Cillin antivirus
- ★ PC-Doctor
- ★ My Aspire Guide
- ★ Aspire restore CD
- ★ Includes V.90 Modem

Includes Microtower housing & 8MB ATi Xpert RagePro TURBO 3D graphics accelerator.

17" Monitor Upgrade to AcerAspire

(xxxxx) **$Call**

RentSmart* $Call / Week

	Aspire 6300	Aspire 6400	
CPU	Celeron 500MHz	Pentium III 500MHz	Pentium III 550MHz
RAM	64MB	96MB	128MB
HDD	10GB	13GB	20GB
CD/DVD	40x CD-ROM	40x CD-ROM	6x DVD
V.90 Modem	Yes	Yes	Yes
Monitor	Acer Aspire 15"	Acer Aspire 15"	Acer Aspire 15"
OS	Win98 2nd Edition	Win98 2nd Edition	Win98 2nd Edition
Part number	(92939)	(89647)	(92940)
RentSmart*	$20.07 / Week	$19.84 / Week	$24.00 / Week
Price	**$1,849**	**$2,339**	**$2,832**

APR 4

HARRIS TECHNOLOGY™

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COMPAQ

See this Web Direct Link to see "live" pricing or to order.

Web Direct www.ht.com.au/cat/compaq

Compaq + Quicken = GST Ready

Do you need account software ready for the **GST?** Check page 8

Compaqs Deskpro range of desktop PCs give you the **power to perform**, providing a professional solution for networked and enterprise environments. Offering flexible design, outstanding long-life performance and serviceability, Compaq Deskpro PCs are the manageable enterprise PCs you can count on.



COMPAQ DeskPro EP

No Monitor	Processor	Pentium III 500MHz	Pentium III 500MHz	Pentium III 550MHz	Pentium III 550MHz
	RAM Std/max	64MB/768MB	64MB/768MB	64MB/768MB	64MB/768MB
	Hard Disk Drive	6.4GB Ultra ATA	10GB Ultra ATA	6.4GB SMART II Ultra ATA	10GB SMART II Ultra ATA
	Graphics	Matrox Millennium G200-SD AGP 8MB SDRAM	Matrox Millennium G200-SD AGP 8MB SDRAM	Matrox Millennium G200-SD AGP 8MB SDRAM	Matrox Millennium G200-SD AGP 8MB SDRAM
	CD-ROM Drive	optional	32x max	optional	32x max
Win95	Part # / Rent *	(91427) **$19.84** **$1,841**	(75485) **$19.84** **$2,323**	(91428) **$21.00*** **$1,938**	(79712) **$26.76** **$3,165**
WinNT	Part # / Rent *	(91437) **$21.69** **$1,999**	(75484) **$21.00** **$2,464**	Not Available	(79713) **$27.69** **$3,260**

COMPAQ DeskPro EN

* RentSmart rates are higher when Equipment value is less than $2,000

No Monitor	Processor	Pentium III 500MHz	Pentium III 550MHz	Pentium III600EBMHz	Pentium III 667MHz
	RAM Std/max	64MB/384MB	64MB/768MB	128MB/1GB	128MB/1GB
	Hard Disk Drive	6.4GB Ultra ATA	6.4GB Ultra ATA	13.5GB Ultra ATA	13.5GB Ultra ATA
	Graphics	ATI Rage Pro AGP 2X 8MB SDRAM	ATI Rage Pro Turbo AGP 2X 8MB SDRAM	Matrox Millennium G400SG AGP 16MB SDRAM	Matrox Millennium G400SG AGP 16MB SDRAM
	CD-ROM Drive	32x max	32x max	40x max IDE	40x max IDE
Win95	Part # / Rent *	Not Available	(79711) **$29.30** **$3,457**	(91411) **$29.53** **$3,474**	(91413) **$33.46** **$3,959**
WinNT	Part # / Rent *	(75480) **$21.92** **$2,592**	(79594) **$29.30** **$3,456**	(91412) **$30.23** **$3,569**	(91414) **$34.38** **$4,053**

*Rental figures shown on this page are T.A.P., per week over 3 years, conditions apply.



COMPAQ Presario

Plug into the new range of Presario PCs to experience cutting-edge multi-media, quick Internet access and high-powered features that will simply blow you away. Offering breakthrough value, these PCs are power-packed to meet the individual needs of a growing family by providing the latest and hottest in multimedia computing enhancing 3D effects, animation, imaging & video.

Win98	Processor	Celeron 500MHz	Pentium III 500MHz
	RAM Std/max	64MB/320MB	64MB/320MB
	Hard Disk Drive	8GB Ultra DMA	13GB ULtra DMA
	Graphics	8MB	8MB
	Modem	56K/V.90	56K/V.90
	Drives	40x CD-ROM	40x CD-ROM
No Monitor	Part # / Rent *	(91127) **$18.00** **$1,649**	(91130) **$18.46** **$2,159**
15" Monitor	Part # / Rent *	(91134) **$20.07** **$1,859**	(91137) **$21.46** **$2,528**
17" Monitor	Part # / Rent *	(91135) **$19.15** **$2,245**	(91138) **$23.07** **$2,720**

Compaq Monitors

15" MV520 Monitor **$435** (86202)

17" MV720 Monitor **$615** (86205)



QuickBooks PRO $199 When purchased with a Compaq system. **QuickBooks** invoices, tracks unpaid bills, calculates charges on overdue payments, shows users what they owe, and more. See Web Direct for more info

APR 5

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IBM

HARRIS TECHNOLOGY @ Kmart
Broadway (Sydney) and Burwood (Melbourne)

Web Direct www.ht.com.au/cat/ibmhw

IBM + Quicken = GST Ready

IBM Business Partner

PC 300GL Pentium III



Is your business ready for GST?

You may be looking for a quality system to help you comply with the new tax system. Also check page 8 for GST-ready Quicken and QuickBooks software.

* PIII 500MHz Model
* 128Mb RAM Standard (1024Mb Max)
* 13.5Gb Ultra ATA/66 HDD with S.M.A.R.T. III
* 48x CD-Rom Max.
* Audio: SoundMAX
* Microsoft Windows 98 2nd Edition

CPU/MHz	HDD	RAM	CD/DVD	Modem	OS	Part #	Monitor	*Rent/week	Price
IBM PC300GL Workstation									
Pentium III 450MHz	10.1GB	64MB	No	No	Win98	(88786)	15"	21.23*	$1,968
Pentium III 450MHz	10.1GB	64MB	No	No	Win98	(88789)	17"	18.92	$2,216
Pentium III 450MHz	10.1GB	64MB	No	No	Win98	(88790)	17" Pro	18.92	$2,240

Many more configurations are available. Please call, or visit our website.

* RentSmart Rates are higher for equipment values of less than $2000



QuickBooks PRO

$199

When purchased with an IBM system QuickBooks invoices, tracks unpaid bills, calculates charges on overdue payments, and more. See Web Direct for more info

IBM Business Partner

NetFinity 5000 Server



Offering powerful performance at an entry-level price, this versatile server sets the standard for e-business, small-to-medium business application and file serving, and large enterprise application serving. Available in tower or rack models, it features an integrated Advanced System Management processor and Netfinity Manager software for superior control.

- **Pentium III 600MHz**
- **128MB RAM standard**
- **Maximum storage capacity 91GB**
- **512KB Level 2 Cache**
- **CD-ROM 32x max**
- **Dial-in for control/monitoring/ remote management**
- **Ethernet Integrated Network Interface**
- **Slots and bays (total/available) PCI/ISA 5 (5) x 8 (6)**

Model 86596RY
(81709)

$5,344

Rent* T.A.P.** **$45.23**/wk/3yrs

Call for pricing on other NetFinity 5000 Server Models.

Rental Plan subject to approved purchases. Rental Figures shown are for 36 month terms. GST May apply to commitments made now - see page 2 for more details

APR 6

HARRIS TECHNOLOGY™

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Web Direct www.ht.com.au/cat/hp

HP with FREE GST-Ready Quicken

HP Brio special GST Bundles



	BA400/15	BA400/17	BA600/15	BA600/17
CPU	Celeron®	Celeron®	Pentium® III	Pentium® III
Speed	533MHz	533MHz	550MHz	550MHz
RAM	64MB	64MB	64MB	64MB
HDD	10GB	10GB	10GB	10GB
LAN	10/100	10/100	10/100	10/100
Monitor	15"	17"	15"	17"
CD-ROM	48x	48x	48x	48x
Part	95561	95562	95563	95564
Price	**$2,129**	**$2,289**	**$2,479**	**$2,659**
Rent/Wk	**18.00**	**19.38**	**21.00**	**22.61**

Each system also includes 4 watt HP Speakers



GST Direct Assistance You may be eligible for a $200 Rebate.

Each of these special Brio/Omnibook Bundles includes QuickBooks PRO Version 7 OEM AND Quick Payroll PRO Version 6 OEM to help your business more easily comply with the GST requirements. QuickBooks PRO V7 is GST-Ready.

GREAT BUNDLE
GREAT VALUE

HP OmniBook XE2

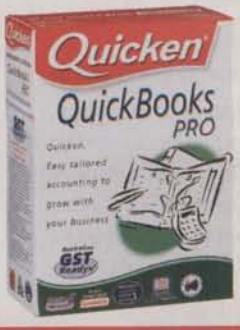
Great Value!



	XE2 C-450	XE2-PIII 500
CPU	Celeron®	Pentium III®
Speed	450MHz	500MHz
Screen	12.1"TFT	14"TFT
RAM	64MB	64MB
HDD	4GB	6GB
Modem	56K Modem	56K Modem
CD/DVD	24X CD-ROM	6X DVD-ROM
Op Sys	Win 95/98	Win 95
	(95567)	(95569)
Price	**$3,529**	**$4,995**
Rent / Week	**30.00**	**42.23**

Each includes QuickBooks PRO V 7





GST-Ready Software

For small to medium sized businesses. QuickBooks is the world's best selling financial management and accounting system. QuickBooks PRO is multi-user capable, features advanced job costing & budgeting, time tracking & billing, integrated estimating & quoting. Can be used for either cash or accrual accounting. QuickBooks PRO 7 is GST-ready.

APR 7

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See Page 2 for Locations

Quicken

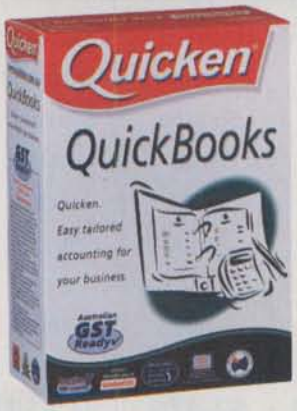
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For LIVE pricing or to order see...

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Is your business ready for the GST?

Quicken QuickBooks



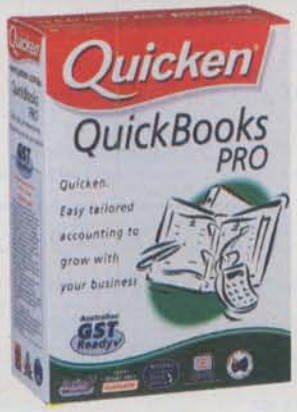
Designed for small to medium businesses. Handles inventory and double entry Accounting. Keeps track of bank balances, loans and other finances. Calculates charges on overdue payments, monitors unpaid bills, writes and prints cheques, records stock and offers 79 different financial graphs and reports. QuickBooks is GST Guaranteed.

- Manages small business finance
- Invoicing and debt management for small business
- Insights into finance
- Accounts receivable / debtors tracking
- Accounts payable / creditors tracking
- Inventory and purchase order control
- Customisable invoices and statements
- Cheque preparation and printing

(94375)

$195

Quicken QuickBooks PRO



With all the features of QuickBooks, QuickBooks PRO allows you to allocate staff time and material costs to a job or project. The additional time management tools, cost estimating and employee hours can flow directly on to invoices. Get an instant snapshot of your business with up to 90 financial reports and graphs.

- **Advanced job costing and bugeting**
- **Cheque and credit card account reconciliation**
- **Flexible and customiseable reporting**
- **90 Reports and graphs**
- **Cheque preparation and printing**
- **Sales tax calculation**
- **Estimates for better quoting**
- **Time tracking/on-screen timer**

(94375)

$328

Be sure to check all of the Quicken options available from the Web-Direct link.

We also stock Quicken, Quicken Deluxe and Quicken Business. Suitable for small business or individual users. A $25 GST upgrade applies to the programs mentioned in this sidebar.

QuickPayroll PRO



Take the stress out of managing your payroll. Produces your group certificates, looks after tax file numbers, bank details, deductions, holidays, sick leave and terminations.

Print payslips, customise your reports, look after Fringe Benefit Taxes (FBT) and remit FBT payments and group certificate data directly to the ATO.

Handles up to 999,999 employees. Gives insights into finances and calculates variable rates of pay. Quick Payroll PRO has recently been awarded Australian PC User Best Buy.

Integrates with QuickBooks or QuickBooks PRO to simplify managing your business.

(77589)

$284

CompletePOS

(84317)

4,595



As the name says: A Complete Point-Of-Sale system, with free GST-ready upgrade. Replaces your existing cash register. Includes QuickPOS V2.0 software, works just like a standard cash register. There are 1050 accredited Trainers and 450 POS consultants across Australia who can assist you with your POS system. To see if there is a consultant in your area take a look at this web direct link:

www.ht.com.au/cat/quicken/pos

APR 8

HARRIS TECHNOLOGY™

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Web Direct www.ht.com.au/cat/rentsmart

Apply Online And Get the Technology You Need- Today!

RentSmart is the first business rental finance company in Australia to enable you to apply and be approved for finance over the web. You can be approved to spend up to $15,000 to get all the computers and office equipment your business needs.



Get the computers and office equipment your business needs NOW.

It's as easy as 1 2 3!

1. - Complete the online application www.rentsmart.com.au
2. - Get preliminary approval ONLINE*
3. - Pick up the equipment you need TODAY** from Harris Technology
 - No deposit
 - No cash payments
 - Just low-cost monthly rental payments

HARRIS TECHNOLOGY @ Kmart
Broadway (Sydney)
Burwood (Melbourne)

RentSmart
It's smarter business to rent.

Renting is the cost-effective solution for many businesses to get the technology they need to succeed, Find Out More...

Phone Harris Technology now on
1300 13 99 99 or RentSmart on 1800 688 777

RentSmart with Harris Technology

The RentSmart online application process is fast, simple and secure. Once approved, you simply select the equipment you need from the Harris Technology catalogue or website, then give Harris a call on 1300 13 99 99. Quote your RentSmart reference number, and Harris will process your order on the spot.



6 Reasons why it's Smarter to Rent

1. **Save Money** - Renting doesn't tie up working capital, and is tax deductible.
2. **Make it Easy** - Low cost monthly rental fees make it easy on your cash flow.
3. **Stay Ahead** - Renting equipment is easy to upgrade to the latest technology.
4. **Get More** - Renting lets you get all the equipment you need NOW!
5. **More Choice** - Find the equipment that best suits your needs, and rent and SAVE
6. **It's fast** - Online applications are fast and secure. Apply now and pick up the equipment you need today.

GST

Rental repayments include GST from 1 July 2000. Repayments will increase up to 10%. This increase will apply to all rentals whether entered into before or after 1 July 2000. If you are in business you may be entitled to an input tax credit of up to 100% of the GST part of any repayment you make. You should seek your accountant's advice as to your entitlement.

* RentSmart is available to qualifying customers on selected products with a total retail value above $500.
** Subject to equipment availability. Rental repayments may be subject to change for GST

Sales: 1300 13 9999 **Fax:** 1300 13 6666 **Website:** www.ht.com.au **E-mail:** sales@ht.com.au

See Page 2 for Locations

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Tecra 8100

Styled for consistant mobile performance, the Tecra 8100 series provides you with the ultimate combination of traditional Tecra investment benefits, high processor performance and a new sleek look and feel.

- 3D Graphics
- 8MB Video RAM

• Pentium III 650MHzSS* • 128MB RAM
• 18GB HDD • 14.1"TFT



From (94187) **$8,469**

Long Term Rent* T.A.P.** **$71.53** per week
Rental prices quoted are subject to change for GST.

Compare Tecra Models

	Tecra 8100	Tecra 8100	Tecra 8100	Tecra 8100
Processor	Celeron 500MHz	Pentium III 500MHz	Pentium III 600MHzSS*	Pentium III 650MHzSS*
RAM Std/Max	64 MB	64 MB	64 MB	128 MB
Hard Disk	6GB	12GB	12GB	18GB
Screen	14.1" TFT	14.1" TFT	14.1" TFT	14.1" TFT
CD-ROM	24x max.	24x max.	24x max.	24x max.
Mic/Speaker	Speakers	Speakers	Speakers	Speakers
Port replicator	Optional	Optional	Optional	Optional
Select bay	Yes	Yes	Yes	Yes
DVD	Capable	Capable	6 x DVD	6 x DVD
Weight	2.8 kg	2.8 kg	2.8 kg	2.8 kg
Warranty	3 Years	3 Years	3 Years	3 Years
DAA modem	Yes	Yes	Yes	Yes
With Windows 95/98	**$5,798**	**$6,995**	**$7,859**	**$8,469**
Rent	$49.15/wk/3yrs* (94180)	$59.30/wk/3yrs* (94183)	$66.46/wk/3yrs* (94185)	$71.53/wk/3yrs* (94187)
With Windows NT 4.0/2000	**$5,990**	**$7,150**	**$7,990**	**$8,650**
Rent	$50.76/wk/3yrs* (94181)	$60.46/wk/3yrs* (94184)	$67.61/wk/3yrs* (94186)	$73.15/wk/3yrs* (94188)

Fly Buys.

Collect Fly Buys points when you purchase from Harris Technology.

intel inside pentium III

Pentium® III available in some Tecra's

HARRIS TECHNOLOGY @ Kmart

Broadway (Sydney)
Burwood (Melbourne)

APR 10

HARRIS TECHNOLOGY™

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TOSHIBA

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Compare Satellite models

Fly Buys.

Satellite 2670DVD

	Satellite 2180CDT	NEW Satellite 2670DVD	Satellite 2650XDVD
Processor	AMD 475MHz	Pentium III 450MHz	Celeron 466MHz
RAM Std/Max	64/192 MB	64/192 MB	64/192 MB
Hard Disk	4GB	6GB	6GB
Screen	12.1" TFT	12.1" TFT	14.1" TFT
Display	800 x 600	800 x 600	1024 x 768
CD-ROM	Yes	Yes	Yes
Mic & Spkr	Yes	Yes	Yes
Port replicator	No	No	No
Select bay	No	No	No
DVD capable	No	Inc 4xDVD	Inc 4xDVD
Weight	3.1 kg	3 kg	3 kg
Warranty	1 Year	1 Year	3 Years
DAA modem	Yes	Yes	Yes
With Windows 95/98 Rent	$3,029 $25.61/wk/3yrs* (90156)	$3,790 $32.07/wk/3yrs* (91260)	$4,497 $38.07/wk/3yrs* (90157)



The Satellite series is the ideal notebook for small and medium business, corporate projects and consumers providing the most CPU/Dollar from a major vendor without compromising features. This new Satellite features a Pentium III 450MHz CPU, 64MB Ram, 6GB Hard Disk, 4xDVD Windows® 98, 12.1" Active Matrix TFT Screen, 56KB Modem in an all new case.

(91260) **$3,790**

Long Term Rent* T.A.P.** **$32.07** per week

Toshiba Install options

For a small extra charge we can install your chosen options into your new Toshiba: a modem, memory, a network card, etc...
Call Harris Technology on 1 300 13 9999 for more information.

Satellite Pro 4320XDVD



Satellite Pro series is the ideal notebook for small and medium business, corporate projects and consumers by providing the most performance for price and a range of expansion capabilities without compromising features.

(94178) **$6,499**

Long Term Rent* T.A.P.** **$54.92** per week

*SS = Speed Step

	NEW Satellite Pro 4270XDVD	Satellite Pro 4280XDVD	NEW Satellite Pro 4320XDVD
Processor	Celeron 500MHz	Pentium III 500MHz	Pentium III 600MHzSS*
RAM Std/Max	64/192 MB	64/192 MB	64/192 MB
Hard Disk	6GB	6GB	12GB
Screen	14.1" TFT	14.1" TFT	14.1" TFT
Display	1024 x 768	1024 x768	1024 x768
CD-ROM	Yes	Yes	Yes
Mic & Spkr	Yes	Yes	Yes
Port replicator	Optional	Optional	Optional
Select bay	No	No	No
DVD capable	Inc 6xDVD	Inc 6xDVD	Inc 6xDVD
Weight	3.1 kg	3.1 kg	3.1 kg
Warranty	1 Year	1 Year	1 Year
DAA modem	Yes	Yes	Yes
With Windows 95/98 Rent	$4,679 $39.69/wk/3yrs* (94172)	$5,690 $48.23/wk/3yrs* (90158)	$6,499 $54.92/wk/3yrs* (94178)

Rental Figures quoted are for business use, includes stamp duty and FID for NSW, to approved purchases. Rental price quoted are subject to change for GST - see page 2 for details

APR 11

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TOSHIBA

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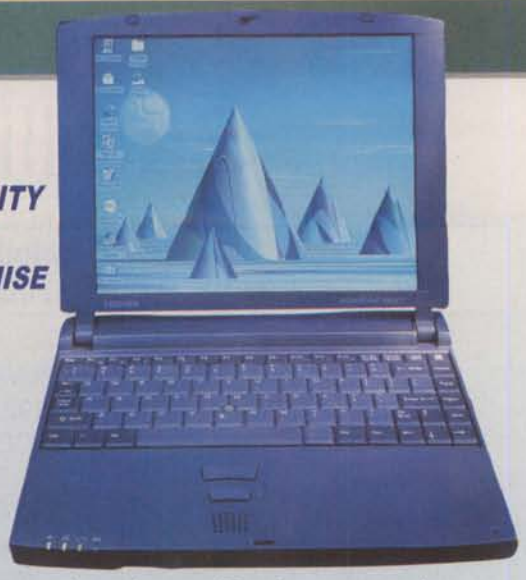
Web Direct www.ht.com.au/cat/toshiba

Toshiba Portégé

	Portégé 3110CT	Portégé 7200CT NEW
Processor	PentiumII 300MHz	Pentium III 600MHz SS*
RAM Std/Max	64/128 MB	64/192 MB
Hard Disk	6GB	12GB
Screen	10.4" TFT	13.3" TFT
Display	800 x 600	1024 x768
CD-ROM	Optional	Optional
Mic & Spkr	Yes	Yes
Port replicator	No	Optional
Select bay	No	No
DVD capable	No	Yes
Weight	1.4 kg	1.9 kg
Warranty	3 Years	3 Years
DAA modem	Yes	Yes
With Windows 95/98 Rent	**$3,720** $31.61/wk/3yrs* (79063)	**$7,135** $60.46/wk/3yrs* (94170)
With Windows NT Rent		**$7,279** $61.61/wk/3yrs* (94171)

*SS = Speed Step

POWER & PORTABILITY WITHOUT COMPROMISE



Incorporating advanced Pentium processing performance Portégé® 3110CT sets the benchmark for ultra portability and performance.
Refined form and subtle curves combined with ultra reliable magnesium alloy sets new standards in industrial design, strength and reliability.
High Capacity Lithium Ion Battery provides 3+ hours* battery life, and Super-start technology allows fast hibernation for even longer battery life.

Options for Toshiba Notebooks

For more options see Web Direct Link







TOSHIBA EDO Memory Upgrades
- 32MB for Tecra 8000 (not for PIII models)/ Portégé7000/Satellite 4000 (29356) **$199**
- 32MB for Portégé 3110 (81078) **$205**
- 64MB for Tecra 8000 (not for PIII models)/ Portege7000/Satellite4000 (29348) **$564**
- 64MB for Portégé 3020 (77229) **$487**

TOSHIBA Battery Packs
- For Satellite 4000/4010/2520CDT & others (21930) **$142**
- For Portégé 3010/3020 (Lithium Ion) (73665) **$139**
- For Satellite 4000 Series (72109) **$127**
- For Tecra 8000 (Lithium Ion) (29358) **$278**

TOSHIBA High Capacity Battery Packs
- For Portégé 3010/3020 (72475) **$278**
- For Portégé 7000/7020 (66479) **$330**

TOSHIBA Battery Charger
- For Tecra 8000 (29357) **$489**

TOSHIBA Universal AC Adapter
- For Tecra 8000/Satellite 4000/4010 & others (44200) **$134**

TOSHIBA Additional 2 Year Warranty
- For Satellites with TFT Display (21729) **$182**

TOSHIBA Port Replicators
- For Tecra II 750/780/8000 (79226) **$725**

TOSHIBA Desk Station V+
- For Tecra 500/550/650/700/750/8000 Series (25446) **$1,352**

TOSHIBA Carry Bags
- Toshiba Friend Carry Bag (75901) **$78**
- Leather Bag for A4 Notebooks (68408) **$205**
- Classic Leather Notebook Carry Bag (79770) **$207**

For more Toshiba options see Web Direct Link or call 1300 13 9999

APR 12

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COMPAQ

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Web Direct www.ht.com.au/cat/compaq

Power and Portability

With stability, quality and reliability, this easy-to-use notebook delivers beyond the latest key core technologies and value for money.



Model	Armada V300	Armada V300	Armada V300
Processor	Intel Celeron 400MHz	Intel Celeron 466MHz	Intel Celeron 466Mhz
RAM	64MB Standard	64MB Standard	64MB Standard
Hard Disk	4.3GB SMART	4.3GB SMART	4.3GB SMART
Screen	12.1" CTFT	14.1" CTFT	14.1" CTFT
Display	800 x 600	1024 x 768	1024 x 768
CD-Rom	24x max	24x max	Optional
Battery Life	up to 3 hours	up to 3 hours	up to 3 hours
DVD	*Optional*	Optional	4xDVD-Rom
Modem	56K	56K	56K
Warranty	1 year, Worldwide Limited	1 year, Worldwide Limited	1 year, Worldwide Limited
Op System	Windows 95/98	Windows 95/98	Windows 95/98
Rent 3 Yrs*	**$28.15**	**$33.23**	**$33.92**
Inc Tax	**$3,315**	**$3,928**	**$3,998**
Part Number	(88078)	(88134)	(88135)

Model	Armada E500	Armada E500	Armada E500
Processor	Intel Pentium II 366MHz	Intel Pentium II 400MHz	Intel Pentium III 450MHz
RAM	64MB Standard	64MB Standard	64MB Standard
Hard Disk	4.3GB SMART	6GB SMART	12GB SMART
Screen	12.1" TFT	14.1" CTFT	14.1" CTFT
Display	800 x 600	1024 x 768	1024 x 768
CD-Rom	24x max	24x max	24x max
Battery Life	up to 3 hours	up to 3 hours	up to 3 hours
DVD	Optional	Optional	Optional
Modem	56K	56K	56K
Warranty	1 year, Worldwide Limited	1 year, Worldwide Limited	1 year, Worldwide Limited
Op System	Windows 95/98	Windows 95/98	Windows 95/98
Rent 3 Yrs*	**$30.92**	**$38.77**	**$45.00**
Inc Tax	**$3,647**	**$4,584**	**$5,325**
Part Number	(90080)	(90082)	(94879)

Model	Armada M700	Armada M700	Armada M700
Processor	Intel Pentium II 366MHz	Intel Pentium II 400MHz	Intel Pentium II 400MHz
RAM	64MB Standard	64MB Standard	64MB Standard
Hard Disk	6.4GB SMART	10GB SMART	10GB SMART
Screen	13.3" TFT	14.1" CTFT	14.1" CTFT
Display	1024 x 768	1024 x 768	1024 x 768
CD-Rom	24 x max	Optional	Optional
Battery Life	up to 3 hours	up to 3 hours	up to 3 hours
DVD	optional	4xDVD-Rom	4xDVD-Rom
Modem	56K	56K	56K
Warranty	1 year, Worldwide Limited	1 year, Worldwide Limited	1 year, Worldwide Limited
Op System	Windows NT4	Windows 95/98	Windows NT4
Rent 3 Yrs*	**$44.76**	**$56.53**	**$58.85**
Inc Tax	**$5,299**	**$6,690**	**$6,949**
Part Number	(87039)	(80338)	(80339)

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*Rental rate for business use, includes stamp duty and FID for NSW. T.A.P. Rental prices quoted are subject to change for GST.

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APR 13

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HP Omnibook Series

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Model XE2: C 450 - 64MB - 4.8GB - 12.1" TFT
From: (94682)
$4,398



Model 4150: C450 - 64MB - 6GB - 14.1" XGA
From: (95124)
$5,990



Model 900: PIII 500 - 64MB - 12GB - 13"
From: (87325)
$5,935



CPU/MHz	HDD	RAM	Screen	CD-ROM/DVD	Modem	OS	Part #	Rent/wk	Price
Omnibook XE2									
Celeron 450MHz	4.8GB	64MB	12.1" TFT	24xCD-Rom	56K	Win95/98	(94682)	$37.15	$4,398
Pentium III 500MHz	6.0GB	64MB	14.1" TFT	DVD	56K	Win95/98	(94683)	$40.15	$4,750
Omnibook 900									
Pentium III 500MHz	12GB	64MB	13" XGA	No	No	Win95/98	(87325)	$50.30	$5,935
Pentium III 500MHz	12GB	64MB	13" XGA	No	No	WinNT4	(87324)	$51.92	$6,125
Omnibook 4150									
Celeron 450MHz	6GB	64MB	14.1" XGA	24xCD-Rom	No	Win 95/98	(95124)	$50.76	$5,990
Pentium III 650MHz	18GB	128MB	14.1" XGA	6XDVD	No	Win95/98	(94684)	$98.07	$11,598
Pentium III 650MHz	18GB	128MB	14.1" XGA	6XDVD	No	WinNT4	(94685)	100.38	$11,885

T.A.P. - Based on 3 year term for business use. Rental prices subject to change for GST.

HP Jornada 680 Handheld

A convenient and versatile PC companion that's prepared for any journey. The HP Jornada 680 provides all the tools you need to manage your personal information while you're away.



(77645) **$1,549**

Jornada 820 Palmtop

8.2" VGA, 640 x480, 256 colour display. 190MHz, 16MB RAM, 16MB Burst Mode ROM, Windows CE 2.2, Pocket editions of Ms Word,Excel, Powerpoint Outlook, Internet Explorer.



(71162) **$1,695**

APR 14

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HP Servers & Networks

Accredited Workgroup Reseller HEWLETT PACKARD

HP PROCURVE

HP ProCurve 224M Switch



(71576) **$1,349**

Ideal for low-cost dedicated 10Mbps desktop switching for small to medium size groups of users.

- Ports: 24 x RJ-45 10BaseT ports, 1 x RJ-45 autosensing 10/100BaseT port, 1 x open 10/100Mbps transceiver port
- IP multicast software prevents flooding of multicast video traffic and supports QoS for IP multicast traffic
- Full duplex on all ports for maximum performance

HP ProCurve 2224 Switch



(75515) **$1,650**

Low-cost desktop switch ideal for delivering performance to workgroups with a mix of 10Mbps and 100Mbps devices and for migrating from 10Base-T to 100Base-TX:

- 24 10/100Base-TX autosensing ports
- One open transceiver slot
- Unmanaged
- Low, industry-leading price

HP Procurve Switch 2424M



(75513) **$2,499**

Desktop switch ideal for low-cost migration to 10/100 stackable switching:

- 24 10/100Base-TX autosensing ports
- Open module slot for Gigabit stacking and uplinks
- Managed
- Low industry-leading price

HP ProCurve 4000M Switch



(66063) **$4,590**

Optional Gigabit Module for 4000M (76563) **$2,079**

A feature-rich, modular 10/100/Gigabit desktop switch that provides scalable, low-cost switching and all the benefits of HP Proactive Networking. Ideal for medium-to-large businesses looking for scalable, expandable, low-cost migration to 10/100/Gigabit switching to the desktop.

HP ProCurve Switch 408



Unmanaged 8 port 10/100 switch in a compact sized package. This switch offers half/full duplex, 10/100 autosensing on every port. Warranty : Lifetime, Exchange Next Day

(75511) **$930**

NETSERVER E60



HP E-60 - Pentium III 500MHz

- ☆ PIII 500MHz
- ☆ 64MB 100MHz ECC SDRAM
- ☆ RAM Expandable to 1GB
- ☆ 9.1GB Hard Disk Drive
- ☆ Dual-ch U Wide SCSI Controller
- ☆ CD-ROM
- ☆ HP Navigator
- ☆ Windows® 95 Keyboard & Mouse

(76023) **$3,628**

RentSmart $30.69/Week*

HP E-60 - Pentium III 550MHz

- ☆ 64MB 100MHz ECC SDRAM
- ☆ 9.1GB Hard Disk Drive
- ☆ Dual-ch U Wide SCSI Controller
- ☆ CD-ROM
- ☆ HP Navigator
- ☆ 4MB AGP ATI Rage II Video
- ☆ 10/100TX LAN
- ☆ 6 shelves, 6 slots (5PCI, 1PCI/ISA)

(84911) **$4,269**

RentSmart $36.23/Week*

All systems include: 7 mass storage shelves (4 available after floppy, CD-ROM & 9GB disc), 6 expansion slots (5PCI, 1PCI/ISA combination), 64MB SDRAM, exp.to 1GB, integrated 10/100 network interface, and HP TopTools for Servers Management Platform.

Why trust your business to a generic box, when you could have a high perfomance HP NetServer that's met the most rigorous of quality standards? The HP NetServer E-60 is easy to set up, easy to expand, easy to troubleshoot, at a price that's easy on your finances.

* T.A.P. - Based on 3 year term for business use. Rental prices quoted are subject to change for GST.

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HP Brio



	HP Brio Entry	HP Brio Performance
Processor	Celeron 533MHz	Pentium 550MHz
RAM Std	64 MB	64 MB
Hard Disk	10GB	10GB
CD-ROM	Yes	Yes
Speakers	HP 4WRMS	HP 4WRMS
DVD capable	No	No
Weight	30.4 kg	30.3 kg
Warranty	3 Years	3 Years
Windows 98	Yes	Yes
With 15" Monitor	(95767) **$1,920**	(95766) **$2,288**
With 17" Monitor	(95765) **$2,090**	(95764) **$2,468**

HP Vectra



Prices quoted for HP Vectra's do not include monitor. Monitor prices are shown below.

- **MultiPurpose, flexible**
- **Quality and reliability**
- **Latest technology**

Part Number	Processor	RAM	Hard Disk	CD-ROM Drive	LAN	Op. System	Price without monitor
(83299)	Pentium III 550MHz	64MB	13.5GB	48x	✓	Win95	**$2,425**
(84408)	Pentium III 550MHz	64MB	8.4GB	Optional	✓	NT 4.0	**$2,585**
(83274)	Pentium III 550MHz	64MB	8.4GB	24x slim	✓	NT 4.0	**$2,425**

* Prices are current at time of print. Prices are subject to change without notice.

HP Kayaks



HP PIII533MHz
- 128MB RAM
- 48x CD ROM
- 10GB UATA Hard Drive
- G250 Graphics Card
- Windows NT 4.0
- LAN

(93803)
$3,279

HP PIII533MHz EB
- 128MB RAM
- 48x CD ROM
- 10GB UATA Hard Drive
- G400 Graphics Card
- Windows NT 4.0
- LAN

(90983)
$3,499

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Model	8602-40U
Size	4.5"x 3.1"x 0.45"
Weight	4.2oz
Storage Cap	2Mb 6000 Address 3000 Appointment 1500 to-do items 1500 memos 200 E-mails
FlashROM	2Mb
	(90105) **$835**

Accessories
Cradle (95369) **$125**
Leather Case (95370) **$56**
Travel Kit (95371) **$128**
Internal Modem 33.6K (95372) **$387**

COMING SOON Model: 8602-30X

Size: 4.7"x 3.2"x 0.7". Weight: 6.0oz. Storage Cap: 4Mb, 12000 Address, 6000 appointment, 3000 to-do items, 3000 memos, 400 E-mails. FlashROM: 2Mb

GST may apply on Commitments made now!

Please note that the GST tax may apply to purchases and commitments made prior to 1st July 2000. Harris Technolgoy reserves the right to charge GST on all purchases or committments which incure GST Liability

IBM Business Partner

ThinkPad 600



Model 26458EA (92160)

$7,259

Rent* T.A.P.** for **$61.38** per week over 3 years

ThinkPad 600
Pentium III 500MHz
Model 26458EA
- 13.3" TFT display
- 12GB HDD
- 64MB SDRAM
- 56K Modem
- 24x Max CD-ROM
- Windows® NT

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Other ThinkPads available

CPU/MHz	HDD	RAM	Screen	CD-ROM/DVD	Modem	OS	Part #	Rent/wk	Price
ThinkPad iSeries									
Celeron 466Mhz	6GB	64MB	13.0" HPA	CD-Rom	56K	Win98SE	(93909)	$23.76	$2,798
Pentium III 500Mhz	6GB	64MB	15" TFT	DVD	56K	Win98SE	(92155)	$42.23	$4,995
ThinkPad 390X Series									
Pentium III 450Mhz	12GB	64MB	14.1" TFT	CD-Rom	-	Win98	(88823)	$47.76	$5,639
Pentium III 450Mhz	12GB	64MB	14.1" TFT	CD-Rom	-	Win NT4	(88799)	$48.46	$5,735
ThinkPad 600 Series									
Pentium III 450Mhz	6GB	64MB	13.3" TFT	CD-Rom	-	Win98	(92156)	$50.30	$5,947
Pentium III 500Mhz	12GB	64MB	13.3" TFT	CD-Rom	56K	Win98	(92158)	$63.92	$7,550
Pentium III 500Mhz	12GB	64MB	13.3" TFT	CD-Rom	56K	Win NT4	(92160)	$61.38	$7,259

T.A.P. - Based on 3 year term for business use. Rental prices subject to change for GST.

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Acer TravelMate Notebook Series

Perfect combination of connectivity, portability and design elements.



Model	341T CD	341T DVD	507DX
Screen	12.1" TFT	12.1"TFT	12.1" DSTN
CPU	PIII 500MHz	PIII 500MHz	Celeron® 466MHz
Memory	64MB	64MB	64MB
HDD	6GB	6GB	4.8GB
CD-ROM	24xCD	NO	24xCD
DVD	NO	2xDVD	NO
Fax/Modem	56Kbps	56Kbps	56Kbps
LAN Card	10/100 LAN	10/100 LAN	NO
Op. system	Windows® 98	Windows® 98	Windows® 98
Part number	(94817)	(94818)	(94819)
RentSmart*	$42.23/week	$45.69/week	$22.84/week
Price	**$4,995**	**$5,395**	**$2,695**

*RentSmart The figures shown are based on a per week basis over 3 years. To approved persons, Terms and Conditions apply. GST May apply to commitments made now! Refer to Page 2 for more details.

Acer **Our 2-hour warranty service is our commitment to you.**

Everyone at Acer is committed to being there for you like no one else will. That's why six out of ten of Australia's biggest IT users, use Acer PCs. And why Acer was rated No.1 in customer service and support by the Australian Personal Computer magazine survey. Our quality TravelMate notebooks now carry our guarantee of a 2-hour warranty service in Sydney, Melbourne, Brisbane, Canberra, Perth and Adelaide*. This means we'll fix your TravelMate notebook within two hours of you dropping it off at one of our service centres. Acer is the only computer company that can make that assurance to all its customers. Call 1300 366 567 or visit www.acer.com.au.

*Metropolitan areas only.

Acer Australia



Model	514T	514TXV	732TX
Screen	12.1" TFT	14.1" TFT	14.1"TFT
CPU	Celeron® 466MHz	Celeron® 466MHz	PIII 500MHz
Memory	64MB	64MB	64MB
HDD	4.3GB	6.0GB	9GB
CD-ROM	24xCD	NO	NO
DVD	NO	2xDVD	6xDVD
Fax/Modem	56Kbps	56Kbps	56Kbps
LAN Card	NO	NO	10/100 LAN
Op. system	Windows® 98	Windows® 98	Windows® 98
Part number	(94820)	(94821)	(94822)
RentSmart*	$26.30/week	$37.15/week	$50.76/week
Price	**$3,095**	**$4,395**	**$5,995**

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4 HOUR

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AcerAltos 330

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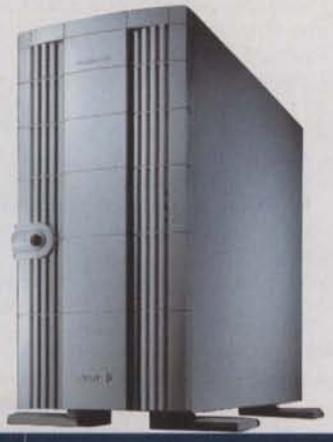


AcerAltos 500

Optimum Scalability & Premium Flexibility

AcerAltos 1100E

Optimum Scalability & Premium Flexibility



Model	AA330	AA500	AA1100E
CPU	Intel Pentium III 550MHz	Intel Pentium III 550MHz	Intel Pentium III 600MHz
RAM	64MB SDRAM ECC	128MB SDRAM ECC	128MB SDRAM ECC
HDD	9.1GB LVD 68PIN	9.1GB LVD 80PIN	9.1GB LVD 80PIN
Graphics	4Mb AGP Graphics Card	4Mb AGP Graphics Card	4Mb AGP Graphics Card
CD-ROM	40x IDE	40x IDE	40x IDE
OS	WinNT4 - 5 CAL	WinNT4 - 5 CAL	WinNT4 - 5 CAL
Other	Lotus Mail	Lotus Mail	Lotus Mail
Part #	(94787)	(94804)	(94812)
Price	**$4,478**	**$5,598**	**$7,838**
Rent	$37.84/wk/3yrs*	$47.30/wk/3yrs*	$66.23/wk/3yrs*

Raid Kits	AA500	AA1100E	AA1100E
Raid Cont'	Mylex Acceleraid 150	Mylex Acceleraid 150	Mylex Extemeraid 1100
HDD	2x9.1GB LVD	2x18.2GB LVD	2x18.2GB LVD
Part #	(94814)	(94815)	(94816)
Price	**$2,438**	**$3,658**	**$6,098**
Rent	$20.76/wk/3yrs*	$30.92/wk/3yrs*	$51.69/wk/3yrs*

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*RentSmart
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Acer **Acer Server Commitment - Our Four hour warranty service should keep you confident.** There's a certain peace of mind in knowing that, with Acer, your downtime will be minimised. That's why six out of ten of Australia's biggest IT users, use Acer PC's. And why Acer was rated No. 1 in service and support by the Australian Personal Computer magazine survey. Better still, Acer now guarantees a 4 hour onsite warranty service as standard on all Altos servers. This means that we'll be there to help you within four hours of you calling us. Our full range of servers are designed to suit a variety of customer needs. So whether your organisation is big or small, Acer is here to look after you like no one else will. *Call 1300 366 567 or visit www.acer.com.au* *Metropolitan areas only. Acer Australia

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The SGI Internet Server is optimised to provide high performance on the Linux Operating System

SGI Internet Server for Linux

Plug, Power & Provide for only $82.38/wk*



- Pre-loaded solution for medium business Intranets and Internets
- Pre-built ready to serve!
- Combines the convenience of an appliance with the flexibility of an open system
- Everything you need pre-installed in one complete package:
 - Apache Web-Server
 - Security software
 - Performance monitoring software
 - Red Hat® Linux 6.1
 - ProPack 1.2 for Linux
- All running on SGI's new high-performance SGI1200 Server
- Fully supported through SGI Global Support

Single 550MHz Pentium III Upgradeable to Dual 700MHz

SGI Internet Server package from:

$9,750

Rent * T.A.P.** per week over 3 years: **$82.38**

SGI Internet Server *Designed for ISPs, ASPs, and co-location facilities, the Linux® OS-based SGI Internet Server is a cost-effective, completely integrated, thin serving solution, which provides quick installation and deployment for these high-growth environments.*

SGI Internet Server Features and Benefits:

- Low entry cost
- Thin (2U) form factor for more units per rack
- Reliable Linux operating system
- Preinstalled, fully supported tools and applications for quick deployment, easy monitoring, and remote administration
- Lights-out-management
- Security lockdown and intrusion detection software
- Web-base tools to streamline installation, troubleshooting, and networking
- High-performance integrated basic services for Web serving and messaging
- Preinstalled Apache Web Server software plus SGI performance enhancements
- Single-point-of-call support with SGI's industry leading global support
- *A solid foundation for applications such as Web hosting, E-commerce, messaging and media serving*

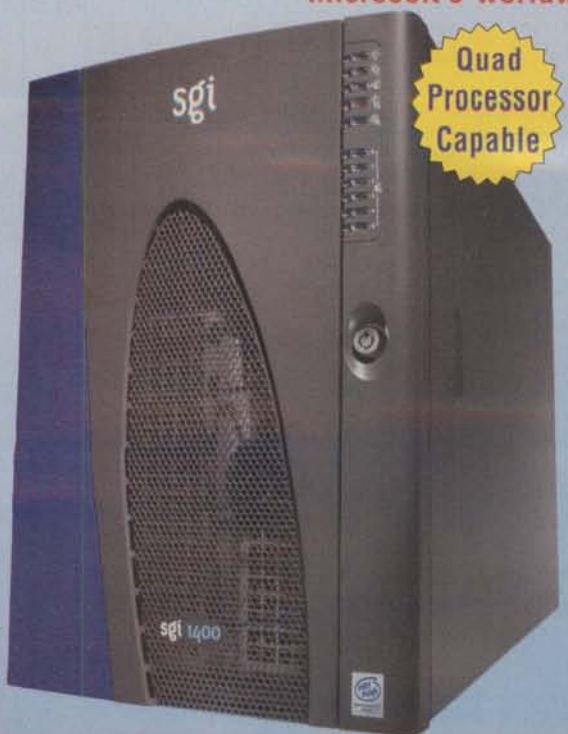
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SGI 1400 Server for Windows and Linux

Scalable server that exceeds requirements for certification by Microsoft's worldwide hardware quality lab



Quad Processor Capable

- 1 to 4x 550MHz Pentium III Xeon Processors
- 256MB ECC Memory (max 4GB)
- 9GB Ultra 2 SCSI Disk
- Windows NT 4.0 Server or Linux (optionally available)
- 6x Ultra2 SCSI hot-swap drive bays
- 7x PCI slots on 2 buses
- 19 Inch rack-mountable (optional kit required)
- High availability features: hot-pluggable disk drives, emergency management port, visual indicators for component health, redundant fan and power supplies, ECC memory
- Robust management and monitoring options, including Intel server control and SNMP support
- 1 Year Warranty (3 Year Option available)

SGI 1400 from: **$15,995**

Rent * T.A.P.** per week over 3 years: **$135.23**

APR 20

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NEW Visual Workstations from SGI



Introducing the **Silicon Graphics 230** visual workstation, the first of a new line of visual workstations from SGI. This new family delivers the best of SGI graphics capabilities in a completely compatible and standard **Intel-based** platform that once again sets a new bar for price/performance.

These new systems give technical and creative professionals a solution that best supports the most demanding applications, ranging from Windows based applications to Linux solutions.

Silicon Graphics 230 Visual Workstation

Base System features:

- 1 x 667MHz Pentium III Processor
- 133MHz System Bus
- Silicon Graphics V-Pro 32MB DDR Graphics Card
- 128MB ECC 133MHz Memory (1.5GB max)
- CD-ROM, 1.44MB Floppy Drive
- Red Hat® Linux 6.1 or Windows NT4.0
- 20GB IDE Disk Drive
- 5 x PCI slots
- 3 x 3 1/2" internal drive bays, 3 x 51/4" external
- Single-channel 10/100 Base-T Ethernet
- 3 Year Warranty (1 year On-Site)

Key Graphics Features of the Silicon Graphics 230:

- AGP 4x with Fast Writes
- Integrated Transform and Lighting
- 256-bit QuadPipe Rendering Engine
- 256-bit 2D Rendering Engine
- *High-Speed Memory Interface with DDR memory*

Upgradeable to 733MHz

SGI Graphics 230 Visual Workstations start from:

$6,499

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Silicon Graphics 1600SW Flat Panel Monitor

You'll never look at a monitor the same way again.

High resolution 17.3" 1600x1024 LCD monitor. 16.7 million colours (24-bit true colour; no dithering). Unique SuperWide screen displays two full pages. Supports ColorLock colour calibration. Ultrafine dot pitch (0.23mm) for professional quality image editing (110dpi). Fast pixel response for video playback. Dimensions incl. base: 17.8"W x 18.3" H x7.3" D, 7.2Kg.

With 32MB Revolution IV PCI Graphics Card:

(75447) **$5,843**

Rent* T.A.P.** **$49.38**/wk/3yrs

With 32MB Revolution IV AGP Graphics Card:

(75448) **$5,843**

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CHOICE You choose the Operating System that's right for you: Linux or Windows NT4.0 or Windows 2000

Entry level and other configurations available. Call for pricing.

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Refer to Page 2 for more details.



High Performance Viper RAID disk storage for NT, Novell, Unix, and Linux systems.
Supports all open systems including Compaq, HP, IBM, DEC, SUN, NCR, ACER, NEC, SGI.

Viper RAID Tower or Rackmount includes:

- 3 year on site warranty
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- Transportable storage - change your server brand and take your already paid for RAID Disk systems with you!
- Dual redundant load sharing hot swap power supplies and fans
- System platform independent (simple Plug and Play SCSI)
- 3 month unconditional money back guarantee on all XSI Viper-RAID Systems
- 6 x 7200rpm hot swap disk drives.
- Ultra-2 SCSI 80MB/sec host support (Ultra and fast wide)



XSI Viper NT RAID System - 120 (100GB RAID 5)

80GB Raid 5 with 1x online hot spare
Tower or Rackmount
120GB Gross Storage
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(87614) **$11,987**

RentSmart* $101.30/week

XSI Viper NT RAID System - 170 (140GB RAID 5)

112GB Raid 5, 1x online hot spare
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170GB Gross Storage
140GB Usable RAID 5 Storage

$ PRICE REDUCTIONS

(87615) **$13,589**

RentSmart* $114.92/week

XSI Viper NT RAID System - 200 (170GB RAID 5)

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Tower or Rackmount
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170GB Usable RAID 5 Storage

$ PRICE REDUCTIONS

(87616) **$16,299**

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Pipeline Networking Series

The Pipeline series is a broad range of easy to use **ISDN** routers, bridges and terminal adapters. They each have the bandwidth, speed, protocol support and security you need for fast, reliable, and safeguarded communications. The Pipeline range all come standard with the Secure Connect Firewall Software.

Pipeline 50

The Lucent Pipeline 50 is an Ethernet to ISDN router/bridge. It **allows** an unlimited number of users high-speed access to a corporate headquarters or the Internet.

Features

- Concurrent bridging and routing. BCP standard bridging. IP, IPX and Appletalk routing.
- VPN ready **with 40-bit IPSec encryption (optional upgrades to 56-bit/3DES)**
- Industry standard user authentication
- ATMP tunneling
- Advanced functionality



Special $ LOW PRICE

(19379)

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Pipeline 75

The Lucent Pipeline 75 is an Ethernet to ISDN router/bridge. It has dual analog telephone ports that offer an unlimited number of users high-speed access to a corporate headquarters or the Internet.

Features

- Concurrent **BCP standard bridging** and routing. IP, IPX and Appletalk routing.
- VPN ready **with 40-bit IPSec encryption (optional upgrades to 56-bit/3DES)**
- Industry standard user authentication
- SmoothConnect features **for easy configuration**
- ATMP tunneling
- Integrated analog/digital capabilities
- Advanced functionality



Special $ LOW PRICE

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$1099

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Pipeline 85

The Lucent Pipeline 85 is an Ethernet to ISDN router/bridge. It has analog capabilities and an integrated 4-port **10base-T** hub.

Features

- Concurrent **BCP standard** bridging and IP, IPX, and Appletalk routing.
- VPN ready **with 40-bit IPSec encryption (optional upgrades to 56-bit/3DES)**
- SmoothConnect features **for easy configuration**
- Integrated analog/ digital capabilities
- Industry standard user authentication
- ATMP tunneling
- Integrated four port Ethernet hub
- Advanced functionality



Special $ LOW PRICE

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AMD Athlon configs **$Call** for pricing & information

Options

RAM upgrade to 64MB (28264) **$42**

RAM upgrade to 128MB (73256) **$177**

Hard Drive Upgrade to 13GB Ultra DMA (80042) **$67**

CD-ROM 48x Internal IDE (89109) **$102**

8x Internal DVD-ROM and software DVD Player (94926) **$233**

Compucon AMD

(89089) **$1,215**

Compucon AMD unit with the following:
- AMD K6-2 400MHz Processor
- 6.4GB Hard Disk Drive
- 32MB SDRAM
- 4MB AGP Graphics Card (ATI Rage)
- 1 x AGP, 4 x PCI and 2 x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 95 or 98
- PS/2 104-key Keyboard
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 10MB Combo Network Card
- 3 Years On-Site Warranty

This system with 15" Compucon Multimedia Monitor: **$1,545**
Monitor price is **$330** (25874)

Intel Celeron

(94882) **$1,259**

Compucon Celeron unit with the following:
- Intel Celeron 466MHz Processor
- 6.4GB Hard Disk Drive
- 32MB SDRAM
- 4MB AGP Graphics Card (ATI Rage)
- 1x AGP, 3x PCI and 1x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 95 or 98
- PS/2 104-key Keyboard
- 10MB Combo Network Card
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

This system with 15" Compucon Multimedia Monitor: **$1,589**
Monitor price is **$330** (25874)

Intel Pentium III

(94892) **$1,699**

Compucon Pentium unit with the following:
- Intel Pentium III 550MHz Processor
- 6.4GB Hard Disk Drive
- 32MB SDRAM
- 4MB AGP Graphics Card (ATI Rage)
- 1x AGP, 4x PCI and 3x ISA Slots
- 2 Serial, 1 Parallel & 2 USB Ports
- PS/2 Wheel Mouse
- Windows 95 or 98
- PS/2 104-key Keyboard
- 10MB Combo Network Card
- Midi-Tower Case
- 1.44 Floppy Disk Drive
- 3 Years On-Site Warranty

This system with 17" Compucon Multimedia Monitor: **$2,170**
Monitor price is **$471** (25906)

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NEW PRODUCT

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The only access cards with integrated connectors! No more hassles with fragile cables and pop-out jacks.

The Only Personalized Notebook Communications Solutions: The RealPort2 Integrated PC Card with Built-in Connectors and Mix and Match Flexibility. RealPort2 Integrated PC Cards with built-in connectors add flexibility by enabling users to choose from a wide variety of access cards that can be used alone or mixed and matched to meet communications requirements now and in the future. Combine a 56K modem, 10/100 Ethernet LAN, wireless data access via your mobile phone, ISDN and more! And add future technologies like broadband and Bluetooth when available.



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1. Choose Desired Realport2 Cards
2. Flip one RealPort2 card over and place on top of the other
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4. Insert joined cards into PC Card slot of Notebook
5. Plug in cables

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Realport2 Global Access Modem	(92739)	$367
Realport2 10/100 Ethernet Card	(92746)	$318
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PortStation Modules End Caps	(82215)	$159
7-port USB Hub Module: Adds 7 USB ports for printers, keyboards, mice, storage devices, etc.	(82217)	$162
Parallel DB-25 Module: Adds one parallel port for printers.	(82218)	$88
Serial DB-9 Module: Adds two serial ports for mice, handheld PDA cradles ext. modems etc.	(82219)	$210
Serial PS/2 Module: Adds two serial ports for mice, keyboards, etc.	(82220)	$118
Ethernet 10 Module: Provides connection to 10Mbps Ethernet networks.	(82221)	$178
Modem 56 Module: Provides high speed 56K* modem connection.	(82222)	$280
PortStation Kits (include end caps, AC power adapter and USB cable) **USB Hub Starter Kit:** 7-port USB Hub module	(82223)	$279
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Xircom PortGear™ - Port Expansion Solutions

PortGear™ is all about USB. The new standard for connectivity.
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Xircom Realport Ethernet 10/100	(67216)	$278
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- PPLS Laser system for less errors
- 16x Audio extraction speed

8 WRITE 4 REWRITE 24 READ

CRW8424EVK - E-IDE kit, complete with Adaptec Easy CD Creator V4.0, Direct CD V3.0, Take Two backup cable, screws, manual, Australian Warranty.

(90113) **$479**

CRW8424SVK - SCSI Internal Kit, with Adaptec Easy CD Creator V4.0, Direct CD V3.0, Take Two backup cable, screws, manual, Australian Warranty. No SCSI Card Incl.

(90112) **$525**

CRW8424SXVK - SCSI External Kit, with Adaptec Easy CD Creator 4.0, Direct CD V3.0, Take Two software, power cable, manual, Australian Warranty. No SCSI Crd or Cable.

(90114) **$679**

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YSTM8



Compact speaker boxes with dual inputs, head-phone socket and audio output for a subwoofer. Frequency response 80Hz-20kHz.

(81340) Black **$80**

YSTMS30 **$139**

(86029) White



3-piece Powered Multi-media speakers/sub-woofer with 30 watts of power and magnetic shielding to eliminate monitor distortion.

YSTMS55D

Satellite/Sub "Killer" system, with 80 watts RMS. 20W and 20W (left and right) and 40W SubWoofer. 2 Analogue and 1 USB input. White (81345):



(81345) White **$274**

Yamaha audio quality makes such a difference to your desktop!



Model:	YSTM8	YSTMS30	YSTMS35D	YSTMS100	YSTMS55D	YSTMSW8	YSTMSW10
Description:	Full range powered monitor speaker pair	3-piece powered speakers & sub-woofer system	3-piece powered speakers & sub-woofer system	Full range powered monitor speaker pair	3-piece powered speakers & sub-woofer system	Powered subwoofer	Powered subwoofer wooden cabinet
Watts:	2x 5w	2x 6w speakers, 18w subwoofer	2x 6w speakers, 18w subwoofer	2x 20w	80w speakers, 40w subwoofer	15w	25w
Features:	Ashtonishly deep bass. Subwoofer and headphone output jacks. Dual stereo inputs.	2" Satellite speakers for brilliant highs. Deep, powerful bass to 45Hz.	USB architecture for superior soundand easy Plug and Play installation.	Non-resonant wood fiber. Powerful base. Stunningly clear sound.	USB. Deep, powerful bass, brilliant highs. Headphone output jack.	Deep bass. Subwoofer and headphone out-put jacks.Dual stereo inputs.	Incredible audio depth, auto on/off Chest-thumping bass response down to 35Hz.
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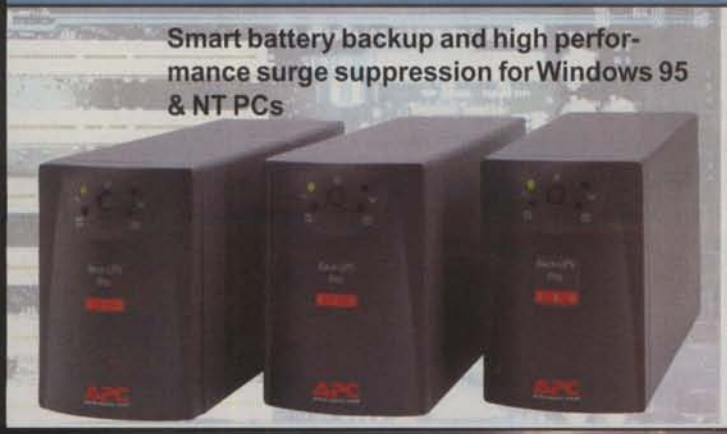
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for Win NT **$130** (19558)



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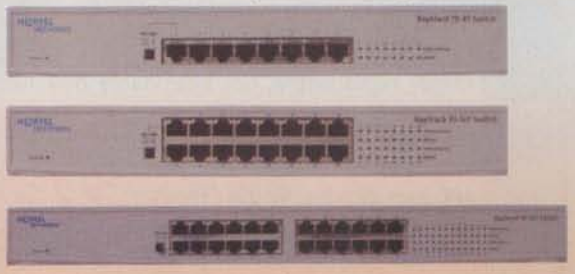
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UNMANAGED SWITCHES

NORTEL NETWORKS BayStack 70

Affordable, reliable, and fast connectivity for growing networks. Perfect for cost-conscious customers who don't need complicated management features, but who demand high-speed performance and scalability to support future needs, BayStack 70 switches boost the performance of desktops by providing dedicated bandwidth directly to users and high utilization servers.



- 10/100, full- and half-duplex autosensing on every port
- Ease of use
- Truly plug-and-play
- Full wire-speed forwarding rate
- Up to 12,000 MAC addresses
- Front panel MDI/MDI-X port
- Concise LED display and much more.

(87936) **70-8T**: 8 ports 10/100 BaseTX, 8000 MAC addresses, desktop **$659***

(87937) **70-16T**: 16 ports 10/100BaseTX, 12000 MAC addresses, desktop **$1,266***

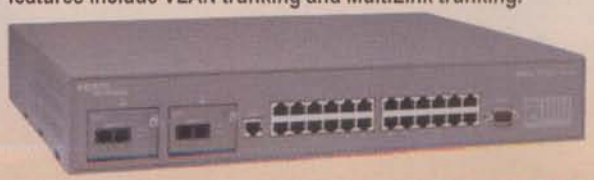
(87938) **70-24T**: 24 ports 10/100BaseTX, 12000 MAC addresses, rackmountable **$1,832***

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MANAGED SWITCHES

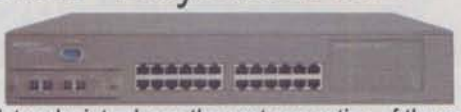
NORTEL NETWORKS BayStack 310

The BayStack 310-24T switch is designed to improve network performance and prepare networks for future bandwidth needs by segmenting the network into smaller domains, and by providing affordable dedicated bandwidth to power-user desktops and high-utilization servers.
Cost effective desktop and segment ethernet switching - Scalable from one to three 10/100BaseTx switch ports - Flexible cabling options for fast ethernet, including copper or fiber - Advanced features include VLAN trunking and MultiLink trunking.



(87940) **310-24T**: 24 ports 10BaseT **$2,170**

NORTEL NETWORKS BayStack 350



Nortel Networks introduces the next generation of the most successful workgroup switches ever, completely redesigned for faster throughput, with support for high-speed uplink options, and leading-edge software features. Wire-speed throughput - 10/100 autosensing on every port - Advanced VLAN support- 802.1Q VLAN trunking - 802.1p priority queuing - MultiLink trunking - IGMP Snooping - More than 16,000 MAC addresses per switch - Supports spanning tree protocol - Flexible management choices - Concurrent RMON on every port - Enhanced port mirroring and much more.

(87941) **350-12T**: 12 ports 10/100BaseTX **$2,428***

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STACKING SWITCHES

NORTEL NETWORKS BayStack 410

An affordable, stackable 10BASE-T switch solution for growing network environments. Flexible high-speed uplink options - Full autosensing on every port - High-density fiber ports - Redundant cascade stacking architecture - Wire-speed throughput - Advanced VLAN support - 802.1Q VLAN trunking - 802.1p priority queuing - IGMP snooping - Enterprise-sized MAC address table - Supports spanning tree protocol - Flexible management choices- Enhanced port mirroring - Recovery configuration file support and much more.



(87943) **410-24T**: 24 ports 10BaseT only **$2,645**

NORTEL NETWORKS BayStack 450



Ethernet switches featuring fail-safe stackability, flexible choices for high-speed uplinks, and advanced software features. Designed to provide high-density, high-performance switching for enterprise wiring closets, and to provide fail-safe scalability and advanced traffic management for rapidly growing networks. Full autosensing on every port - Redundant cascade stacking architecture - Wire-speed throughput - Advanced VLAN support - Enterprise-sized MAC address table etc.

(87944) **450-12T**: 12 ports 10/100Base-TX **$2,899***

(87945) **450-24T**: 24 ports 10/100Base-TX **$3,975**

(87946) **450-12F**: 12 ports 100 Base FX **$8,165**

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D-Link USB Range



These Universal Serial Bus hubs connect up to four USB peripherals or devices to a USB-ready PC. It provides out of the box industry standard Bus.

DU-A2	PCI Port USB Adapter	(78987)	$48
DU-E10	USB to Ethernet Adapter	(85109)	$104
DU-H4	4 Port USB Hub	(79131)	$75
DU-H3SP	3 Port USB Hub	(78989)	$159

Expand the number of USB ports on your system

Non USB Hubs also available

DE-809TP	9-port Mini-Hub 9x UTP with Uplink Capability	(32350)	$154
DE-816TP	16-port 10Mb Hub with 1x AUI/ 1x BNC Ports (Rackmount)	(51844)	$275
DFE-905DX	5-port 10/100Mbps Dual Speed Hub w/ Switching	(85102)	$232
DFE-905	Fast Ethernet Network Kit	(76617)	$289
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DM-560	56K Fax/modem PCMCIA Card	(61678)	$160
DFE-660TX	PC Card 10/100 Base-TX Dual Speed	(69449)	$145

D-Link DMF-560TXD No Dongle



The D-Link DMF-560TXD is a Direct Port™ 10/100Mb Dual Speed Ethernet PC Card with integrated V.90/K56flex Data/ Fax Modem. Allows users to send and receive faxes, connect to the Internet, and dial into Remote Access Server or PC using 1 PCMCIA PC Card solution.

(85100) $395

10/100 Fax Modem Dual Speed PCMCIA

D-Link DES-1005D

The DES-1005D is an unmanged 10/100mbps switch designed to enhance small work group performance while providing a high level of flexibility. Powerful yet easy to use, this device allows user's to simply plug boost response time and satisfy heavy load demands



Features,
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- MDI- II Uplink Port
- Supports Half and Full Duplex
- Plug - and - Play
- Plam size

(85101) $175

Switches also available

Boost response times and bandwidth

DES-1016	16-port 10/100Mbs Dual Speed. Supports full/half duplex.	(69456)	$1,184
DES-1008	8-port dual speed 10/100MB Smart Switch	(52207)	$574
DES-1024	24 port dual speed 10/100MB Smart rack mount Switch	(76740)	$1,546
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D-Link RAS Range



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DI-524	2x WAN, 5 Port hub	(79399)	$718

* Internet Server IP

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RM 356 Analog Modem Router

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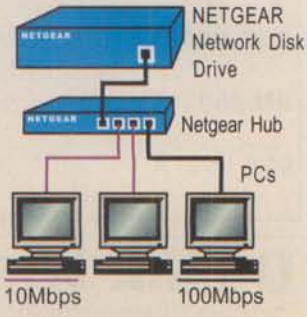
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The FS509 and FS518 high-performance Fast Ethernet Gigabit switches provide a cost effective way to instantaneously boost network performance. Secure the power of Gigabit Ethernet to speed up server and backbone access. Automatic speed & full/half duplex sensing.

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(76840) **$1,689**

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(81514) **$2,665**

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GS 504

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Netgear offers free, 24-hour phone support

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FS 105	5-port Autosensing	(84722)	$289
FS 108	8-port Autosensing	(70905)	$450



The NETGEAR FS516 & FS524 switches provide powerful, network center performance with all 16 or 24 ports capable of 10 or 100 Mbps, half- or full-duplex operation, automatic speed sensing. Ideal for segmenting networks into small, connected subnets. Vista network ports with built-in LEDs.

FS 516	16-port Autosensing	(60522)	$1,155
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The NETGEAR print servers let you share any parrallel printer among all users on the network without having to dedicate a PC for print serving and without complex setup and configuration. These print servers connect directly to the network and can be placed anywhere convenient to the users.



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PS 105	10Mbps Print Server	(67225)	$225



The PS110 attaches to a 10 or 100Mbps hub or switch, providing effortless transition from Ethernet to Fast Ethernet. It also supports 2 parrallel printers.

PS 110	10/100Mbps Print Server	(67226)	$286

10Mbps Ethernet Hubs



Vista jacks with built-in LED indicators • Uplink port for network expansion • Slim, sturdy metal case design • BNC/AUI backbone support option • Limited lifetime warranty • Easy plug and play installation

EN 104TP	4-port Slimline	(53456)	$60
EN 108TP	8-port Slimline	(53458)	$115
EN 116	16-port Slimline	(53459)	$220
EN 516	16-port Rackmount	(17425)	$237
EN 524	24-port Rackmount	(17435)	$325



- 16 or 24 10BASE-T ports
- Easy plug and play installation
- Vista network port with built-in LEDs
- BNC/AUI backbone support
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These Netgear hubs connect multiple PCs to share printers, files, Internet access and e-mail communications. Mix & match 10 and 100Mbps PCs, servers and peripherals on the same network with ease and without the high cost and complexity of multiple hubs and bridges. All feature easy, plug and play installation, auto-sensing dual speed ports and vista network ports with built-in LEDs.



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DS 116	16-port Slimline	(81519)	$440
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- Up to 50 copies from original



(80302) **$928**

HP LaserJet 3150

High quality, Networkable All-in-One.

- 6ppm at 600dpi Print Speed top quality
- One touch send-to-Email scan
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- Internet Fax, full-featured professional LaserJet fax machine
- Additional convenience features include billing code, block fax, dial prefix capabilities



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A dependable addition for any graphic professional. The new DuoScan HiD goes one step further with advanced 42 Bit colour depth and with 3.7. Dynamic range means more colours and definition. • 1000 x 2000 true optical resolution, with interpolation to 4000 ppi • Agfa TwinPlate Technology provides seperate scanning bed for reflective and transparency scanning • Agfa FotoLook 3.5 comprehensive scanner software (including superb negative scanning cababilities, variable USM, Batch scanning and control over colour and tonal corrections) • Agfa ColorTune colour management system includes IT8 colour calibration charts and an extensive range of ICC-compatible device profiles • 4 glass-less batch scanning holders (35mm film strips, 35mm framed, 6x9cm and 4"x5" films)

(92981) **$4,498**

NEW!



SnapScan Touch

Agfa's revolutionary SnapScan Touch USB Scanner has four programmable buttons: scan direct to file, email, fax or printer. 600x 1200 ppi, 36 bit, landscape desktop scanner. Comes with 7 translucent coloured handles! Software: Agfa ScanWise, Caere OmniPage LE OCR, & more.

USB

(87209) **$269**

ePhoto CL30 Clik!



The fantastic ePhoto CL30 now available with built-in Iomega Clik! Drive. Megapixel digital camera with USB interface and a resolution of 1440x1080 pixels. Features an optical viewfinder and 1.8" colour LCD screen. Auto focus lens with 2x digital zoom and macro function.

USB

(89409) **$1,230**

NEW!



SnapScan 1236u

One pass, high quality 600x1200ppi scanner (9600ppi max.) with USB interface. 36 bit colour. Comes bundled with Caere OmniPage LE OCR, Caere PageKeeper, Corel PrintHouse Magic Select & Agfa's incredible ScanWise software.Win98 compatible. ADF & TPO available.

USB

(84306) **$370**

ePhoto CL50



Digital camera with built-in microphone for adding up to 10 seconds of voice or sound per image. Resolution 1600x1200 pixels. 3x optical, 2x digital zoom. Optical viewfinder and 2" LCD screen. Burst mode: hold shutter for continuous shots. The included 8MB card stores up to 96 photos.

(76793) **$899**

SnapScan 1212u



USB

One pass, high quality 600x1200ppi scanner (9600ppi max.) with USB interface. Includes Caere Omnipage LE OCR, Caere PageKeeper, Corel PrintHouse Magic Select & Agfa's incredible ScanWise software. Win98 compatible. **"Best Scanner 1999" - PC World magazine**

White: (74496) **$249**
Green: (75578) **$259**

SnapScan 1212p



One pass, high quality 600x1200ppi scanner (9600ppi max.) with parallel interface. Includes Caere Omnipage LE OCR, Caere PageKeeper, Corel PrintHouse Magic Select & Agfa's incredible ScanWise software. Compatible with Win95/98/NT.

(74495) **$179**

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Transparency adapter for SnapScan 1236. Moving light source. 203x254mm. (76779) **$399**

Document Feeder for DuoScan T1200. (75581) **$458**

Document Feeder for SnapScan 1236 (82625) **$469**

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DuoScan T1200 SCSI-2. 36 bit. Transparency scanning. Opt. res.600x1200ppi (74498) **$1,315**



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Great for busy small businesses which need a work group printer for small to medium print volumes.

- LaserJet 2100TN
- 2 x 16Mb Dimm
- HP SupportPack 3 Yr NDOS

Normally ~~$2,758~~
(93186)
$2,549
SAVE $209



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A wide range of colour printing requirements such as high quality marketing literature and presentation handout output

- Colour LaserJet 4500DN
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- HP ScanJet 6250C
- HP SupportPack, 3 years 4 hour onsite

Normally ~~$11,295~~
(93179)
$10,329
SAVE $966



The Finance Department Deal - Bundle 3*

Great for financial and tax consultants, brokers, accountants & others in the field of finance

- LaserJet 8100DN
- 2000 Sheet Feeder
- 3000 Sheet Stacker
- 2 x 32 Mb Dimm & EIO Hard Disk
- HP SupportPack, 3 years 4 hour onsite

Normally ~~$15,994~~
(93181)
$13,145
SAVE $2,849



The Finance Department Deal - Bundle 4*

Great for financial and tax consultants, brokers, accountants, others in the field of finance

- LaserJet 8100DN
- 2 x 500 Sheet Input Tray
- 3000 Sheet Stacker
- 2 x 32 Mb Dimm & EIO Hard Disk
- HP SupportPack, 3 years 4 hour onsite

Normally ~~$15,994~~
(93182)
$13,145
SAVE $2,849

*These printer bundles valid until 30th April 2000



The on Demand Printing Deal - Bundle 5*

Great for consultants, training companies, law firms and other companies needing printed documents fast, and the ability to print on demand

- LaserJet 8100DN
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- 3000 Sheet Stacker
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- EIO Hard Disk
- HP SupportPack, 3 years 4 hour onsite

Normally ~~$16,768~~
(93180)
$13,659
SAVE $3,109

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Great for consultants, training companies, law firms and other companies needing printed documents fast and the ability to print on demand

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- 3000 Sheet stapler/stacker
- 2 x 32Mb DIMM & EIO Hard Disk
- HP SupportPack, 3 years 4 hour onsite

Normally ~~$16,768~~
(93178)
$13,659
SAVE $3,109



The Virtual Personal Printing Deal - Bundle 7*

Great for small office workgroup combining the advantages of a personal printer with those of a high performance network printer

- LaserJet 8000N
- 7-bin tabletop mailbox
- Duplexor
- 2 x 32 Mb Dimm & EIO Hard Disk
- HP SupportPack, 3 years 4 hour onsite

Normally ~~$11,094~~
(93177)
$9,398
SAVE $1,696

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The Virtual Personal Printing Deal - Bundle 8*

Great for small office workgroup combining the advantages of a personal printer with those of a high performance network printer.

- LaserJet 8000N
- 5 bin mailbox with Stapler
- 2000 Sheet input tray & duplexor
- 2 x 32 Mb Dimm & EIO Hard Disk
- HP SupportPack, 3 years 4 hour onsite

Normally ~~$16,121~~
(93176)
$12,738
SAVE $3,383

*These printer bundles valid until 30th April 2000



The CAD Deal - Bundle 9*

Great for CAD designers, design engineers, industrial designers, architects, interior designers, GIS and others in CAD related technology

- LaserJet 5000N
- Duplexor
- 250 Sheet Feeder
- 2 x 32 Mb Dimm & EIO Hard Disk
- HP SupportPack, 3 years NDOS

Normally ~~$8,341~~
(93175)
$7,169
SAVE $1,172



The Great All-Rounder - Bundle 10*

Great for the busy small business which needs a workgroup printer capable of handling a very wide range of business needs

- LaserJet 4050TN
- Duplexor
- 500 sheet feeder
- 2 x 32 Mb Dimm
- HP SupportPack, 3 years NDOS

Normally ~~$6,370~~
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Magenta (92501) **$179**

Yellow (92502) **$179**

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Model Tektronix	850/N	850/DP	850/DX
Resolution	800 dpi	1200 dpi	1200 dpi
Memory Standard/Max	32 MB (256 MB)	64 MB (256 MB)	128 MB (256 MB)
Built-in Hard Disk	Optional	Optional	2 GB Hard Disk
RISC PowerPC Image Processor	200 MHz	200 MHz	200 MHz
Max. Speed Fast Colour	14 ppm	14 ppm	14 ppm
Max. Speed Standard	8 ppm	8 ppm	8 ppm
Max. Speed Enhanced	4 ppm	4 ppm	4 ppm
Max. Speed High Resolution/Photo	2 ppm	2 ppm	2 ppm
Pipeline Printing	Optional	Standard	Standard
Job Accounting	50 Jobs	500 Jobs	5,000 Jobs
Collation Printing	Optional	Yes	Yes
Duplex Built-in Automatic	Optional	Standard	Standard
Main Paper Tray 200-sheet	Standard	Standard	Standard
Hi-capacity Tray 500-sheet each (two)	Optional	Standard (one)	Standard (one)
Prt number	(90162)	(90163)	(90164)
Price	**$5,729**	**$7,397**	**$9,570**

[1]Requires optional hard disk drive.

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BJC-3000

The BJC-3000 offers an array of features, including resolution up to 1440dpi, and the option of converting your printer into a high quality colour scanner.

- Variable Drop Modulation Technology allows it to generate any of five different dot patterns on the horizontal axis.
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- Up to 9ppm print speed black
- Super fast extra rich blacks.
- Separate ink tanks, low ink detection system.
- Optional Photorealism for exceptional photo quality printing
- Colour Scanner cartridge option. Turns your printer into a high quality colour scanner with resolution up to 720dpi.
- Canon care and dependability. Canon BJC-3000 also features a one year warranty upgradeable to 3 years, backed up by Customer Care Hotline Support and drivers available on the web site www.canon.com.au

(94499) **$269**



BC-33 Colour Cartridge Included (94623)
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BC-30 Black Optional Cartridge (81582)
$84



BC-34 PhotoRealism Optional Cartridge (94624)
$95



IS-32 Scanner Cartridge Optional (94625)
$144



BJC-6000 (79220) $355

High Quality: At 1440 dpi, printouts appear crisp, with razor sharp images and silky smooth tonal gradation. Smooth gradation between dark and light sections. Separate ink tanks: only change the colour you use up. Six colour printing ensures photo quality. 8ppm black, 5ppm colour. Smart Ink Level Detection. Optional USB cable.



LBP800 (83787) $549

Compact desktop laser with face up or down paper delivery, 125 page Multipurpose tray and single sheet Manual Feed Slot. 8ppm, 300x300dpi, 600x600dpi and 2,400dpi with text and line smoothing. 512K buffer. 2,500 pages per cartridge (5% cover). Drivers available: Windows® 95, 98 and NT 4.0.

BJC-265SP

(76009) **$139**

Super Economy mode: cartridges deliver up to 400 pages in colour, 2400 in black. Up to 4ppm in black, up to 0.3ppm colour. Banner printing capable.



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(83661) **$140**

FB-630P Parallel. Optical resolution 600x1200dpi.
(83673) **$189**

FB-630U USB to suit Win98. 600x1200dpi opt. res. One-touch scan button.
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Cartridges for EPSON Stylus colour printers featured on this page...

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(70948)

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Black Ink for EPSON Stylus 900
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Colour Ink for EPSON Stylus 460 & 740
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Colour Ink for EPSON Stylus 900
$69
(76858)

EPSON STYLUS COLOR 460

$199

(84928)



The **EPSON STYLUS COLOR 460** features the advanced technology of EPSON's PerfectPicture Imaging System and superb 720 x 720 dpi Micro Piezo™ printing. Designed exclusively for Windows, it comes with a range of printer driver, software enhancements to make it easy and fun to use. Whether your printing text or images — on plain paper, photo paper, photo stickers or iron-on transfers — the quality of the output is truly amazing.

EPSON STYLUS COLOR 670

$329

(94835)

USB



The **EPSON STYLUS COLOR 670** is ideal for home, school and office use. It provides easy, plug-and-play support for Windows 95/98/2000/NT 4.0 and USB-equipped Macintosh systems. It comes with everything you need to print 1440dpi photo quality colour images from the moment you set it up. What's more, it offers the outstanding performance of EPSON's PerfectPicture Imaging System and Variable-Sized Droplet technology — at a remarkably affordable price.

EPSON STYLUS COLOR 740

$399

(94836)



The **EPSON STYLUS COLOR 740** incorporates 1440dpi resolution and the latest state-of-the-art technology to ensure it is right at home meeting the demands of small and home office users. It features EPSON's Variable-Sized Droplet technology which delivers a precisely controlled blend of small, medium and large ink droplets, resulting in greater detail and smoother halftones and gradations. With PC and Macintosh compatibility and the advantages of USB connectivity the EPSON STYLUS COLOR 740 has created a new standard of image quality for the SOHO environment.

EPSON STYLUS COLOR 900

$738

(74351)



Think business. Think speed. Think EPSON. The **EPSON STYLUS COLOR 900** is a fast A4 colour inkjet printer perfect for the business environment. It prints at a maximum resolution of 1440 x 720 dpi and features EPSON's PerfectPicture Imaging System and Variable-Sized Droplet technology for photo quality output. It is equipped with standard parallel, serial and USB interfaces for flexible connectivity. And, is compatible with Windows 3.1/95/98,NT 4.0, DOS and Macintosh (including iMac & G3) environments. Optional integrated network interfaces and software PostScript™ RIPs are also available options for workgroups and networked users.

Epson Model	460	670	740	900
Print Method	Piezoelect	Piezoelect	Piezoelect	Piezoelect
Print Speed Colour	1.7ppm	3.8ppm	6ppm	11.7ppm
Print Speed Black	4ppm (econ mode)	5ppm	6ppm	12ppm
Print Resolution	720x720	1440x720	1440x720	1440x720
Paper hold capacity				
Plain 100 shts	100 shts	100 shts	100 shts	100 shts
Epson Transparency	10 shts	10 shts	10 shts	30 shts
Envelopes	10 env	10 env	10 env	10 env

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HP DeskJets

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Sharp colours, rich blacks on a budget

- 600x600dpi InkJet Printer
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(80426)

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Brilliant photo quality results on any paper

- 600x600dpi InkJet Printer with HP PhotoREt II
- Up to 6.5ppm print speed (black) and up to 4.5ppm (colour)



(77961)

$294

HP DeskJet 970Cxi

The premier photo quality printer for professionals

- Up to 2400dpi InkJet with HP PhotoREt 3.
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- New! Automatic two-sided printing



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HP DeskJet 950C

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- Alternative 2400x1200dpi mode on photo paper with HP PhotoREt 3
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PCI: (72909) **$84**

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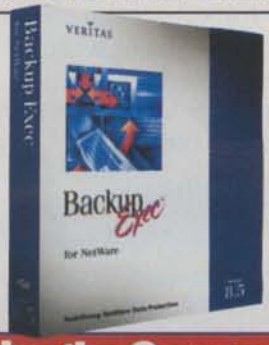
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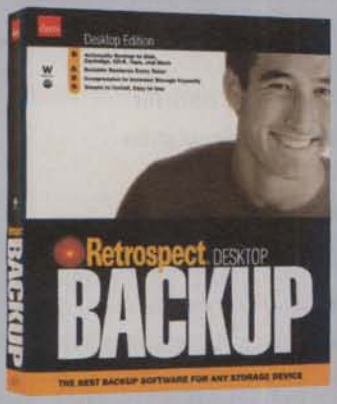
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Retrospect Desktop Backup



The best backup software for any storage device

(88034)
$332

Retrospect Desktop Backup makes it fast and easy to backup, restore, and archive. With an interface that's easy to navigate and backups that can be accomplished in a few quick steps, Retrospect Desktop Backup eliminates the hassle and inefficiency of dragging files from one volume to the next. Features include:

- **Fully automated backups:** Backups launch automatically to run unattended on any schedule. Setup streamlined with EasyScript ™ wizard.
- **One-step hard disk restore:** Even after multiple incremental backups.
- **Compression and encryption:** Dramatically improves storage media capacity, decreases media costs. Provides security for confidential files.
- **IncrementalPLUS ™ technology:** After the initial backup, Retrospect backs up only new or changed files, saving time and storage media.
- **Duplicates:** Performs immediate or scheduled copying of any local volume, network volume, or folder to any other.
- **Archiving:** Store little-used files onto media to reduce free up hard disk space.
- **Easily expandable:** Add support for another 5, 10, 50, or 100 PCs at anytime to your copy of Retrospect with Retrospect Clients (see side bar).

Retrospect Workgroup Backup



The best, most reliable backup for your workgroup and server

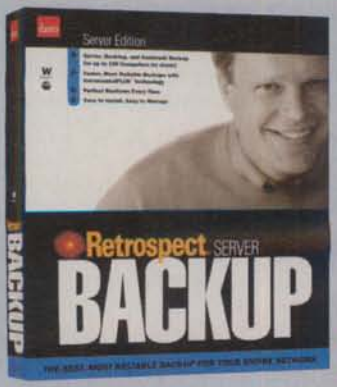
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$676

Retrospect Workgroup Backup provides powerful backup for your entire workgroup across the network to a single storage device. Integrate both desktop computers and notebooks who connect to the network at irregular times into the same backup schedule. Includes all the features of Retrospect Desktop Backup listed above, plus:

- **Central administration:** One person can manage all backup functions: eliminates lengthy user training and difficult installation at each workstation.
- **Backup Server ™:** Determines which computers are most in need of backup and backs them up in order of priority, including notebooks.
- **Advanced security:** Prevents unauthorized access to sensitive data with password protection while retaining individual user's privacy. Encrypts network transfers for additional security.

INCLUDES THE RETROSPECT APPLICATION PLUS 20 CLIENTS

Retrospect Server Backup



The best, most reliable backup for your entire network

(88088)
$999

Retrospect Server Backup includes all of the features found in Retrospect Desktop Backup and Retrospect Workgroup Backup, as well as advanced networking capabilities.

- **Powerful networking** Uses your existing network configuration to back up clients on any subnet. Includes powerful subnet broadcast and direct IP access for multi-network environments.

INCLUDES THE RETROSPECT APPLICATION PLUS 100 CLIENTS

"Retrospect 5.0 Server Edition proved itself in every test... it earns a recommendation from the CRN Test Center." *Computer Reseller News*

"Dantz backup system's flexibility, easy of use should make it a winner...it might well become and overnight sensation." *PC Week*

"Retrospect has several unique technologies that differentiate it from other backup products.... an excellent package." *IT Graphics*



Retrospect Clients
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Max. Resolution	1280x1024 @60Hz	1280x1024 @75Hz	1880x1440 @70Hz	2048x1536 @ 75Hz
Pitch	.24 - .25 aperture grille	.24 - .25 aperture grille	.24 - .25 aperture grille	.24 aperture grille
Our part number	(84021)	(84022)	(84023)	(84024)
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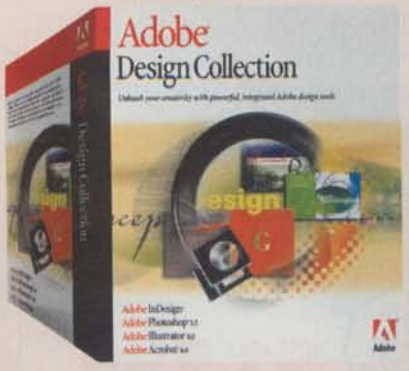
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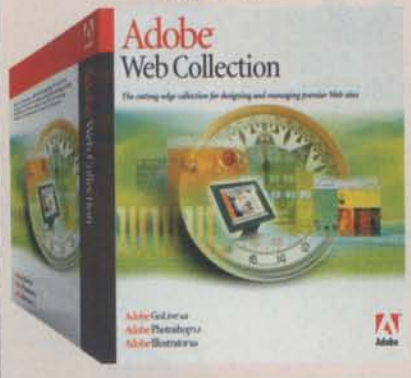


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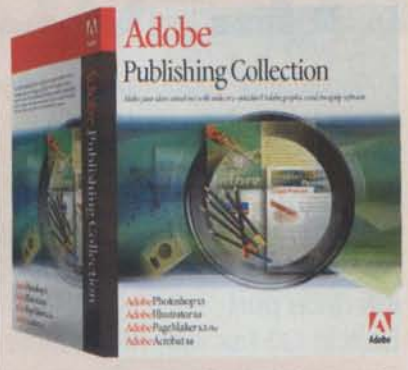


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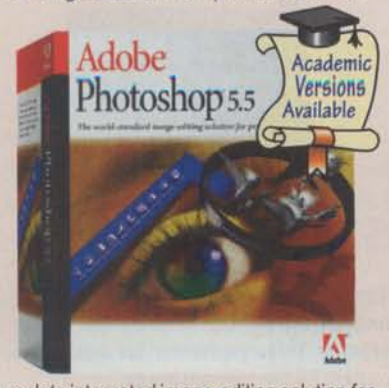


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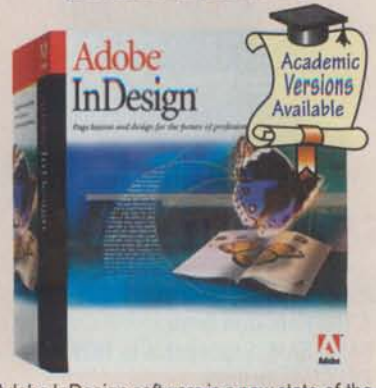


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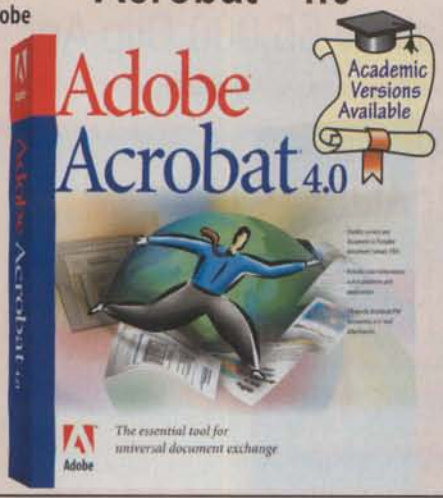
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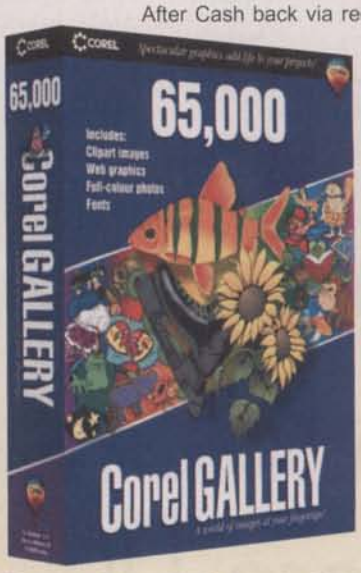
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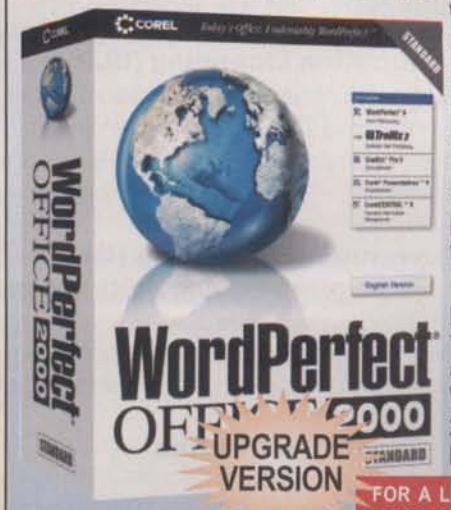
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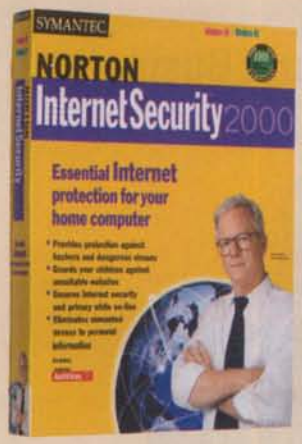
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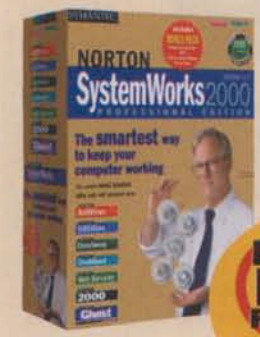
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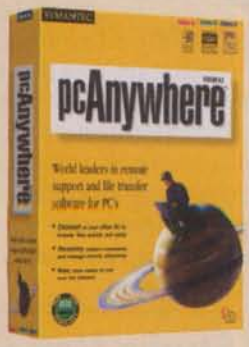
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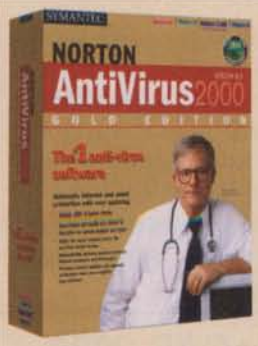


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Makes downloading files off the Internet safer than ever before.

- Monitors your systems in the background to prevent virus entry
- Easy automatic online updates
- Guaranteed satisfaction

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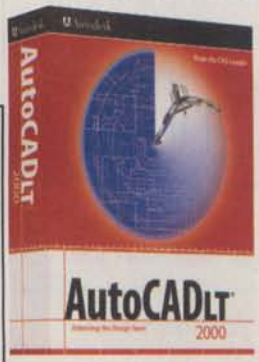
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What today's CAD designers want

AutoCAD LT 2000

Full Version: (81482) **$789**

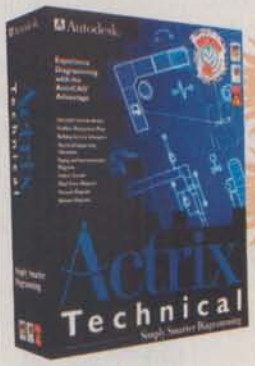
Upgrade: (81486) **$269**



AutoCAD LT® 2000 is the perfect low-cost, 2D CAD tool for today's design environment. That's because there's usually an extended design team working on every project. From the architects and engineers to the drafters, consultants, and clients—your entire team will communicate more easily, share data more accurately, and work more efficiently thanks to all of the professional-strength features of new AutoCAD LT 2000.

Actrix Technical

(79021) **$495**



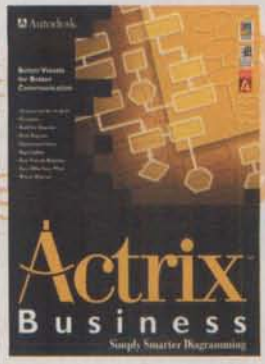
2D Diagramming tool

Imports DWG files

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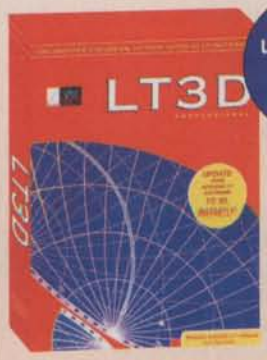


Free upgrade to LT 2000 version!

Smart Architect LT

This architectural drafting application vastly enhances the ability of AutoCAD LT 97 and 98. It caters for all types of building development. The main features consist of walls, windows, doors and roofs, giving the ability to generate 2D drawings and 3D models. Provides tools to cut sections, peel off elevations and automatically dimension the building.

(86112) **$880**

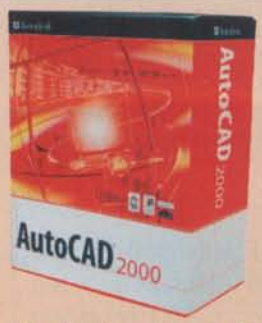


Free upgrade to LT 2000 version!

LT 3D

LT3D is a full 3D modelling plug-in for AutoCAD LT 97 or 98. LT3D provides AutoCAD LT with a range of tools to cater for all types of 3D modelling as well as the power to modify and measure. It includes routines for creating 3D surfaces and solids, and tools for modifying and editing them. In addition there are some routines to make viewing and manipulating your 3D scene much easier.

(86113) **$259**



AutoCAD 2000 Student Version

A feature-rich, streamlined, forward-looking release of the world's leading CAD software product. More than 400 new and enhanced productivity tools. Quickly search, extract and re-use specific design data. Works simultaneously between drawin files. Drag and drop exchange of design information from file to file. Automatically scales drawings to fit your plotter.

(You will need to provide a copy of your Student ID)

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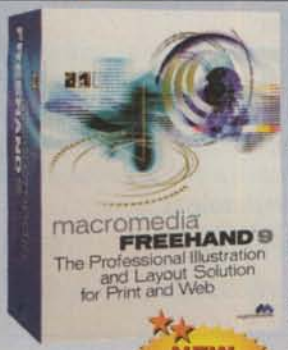
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With Dreamweaver, Fireworks, and Flash, the Web Design Studio is designed to give you everything you need to develop dynamic, professional Web Sites quickly. Transform graphics and code into completed Web Sites in record time with Dreamweaver. Design buttons, animations and page comps with Fireworks, and add high-impact interactivity with Flash.

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Diskeeper V5.0 Server	(82944)	**$489**
Diskeeper V5.0 Workstation	(82953)	**$99**

Undelete



Accidentally deleted files are a fact of computing life. When accidentally deleted files are not in the Recycle Bin, it makes lots of extra work for system administrators. The usual solution is to search through backup tapes until they find the lost file. This often consumes hours. Most businesses run backup at night, so work done after the latest backup is often lost and needs to be recreated. More wasted time and lost productivity. Undelete is a complete solution for Windows NT Servers and Workstations giving a Network Administrator the ability to instantly restore deleted files. As you will see, Executive Software Undelete provides a complete, real world solution to these every day problems.

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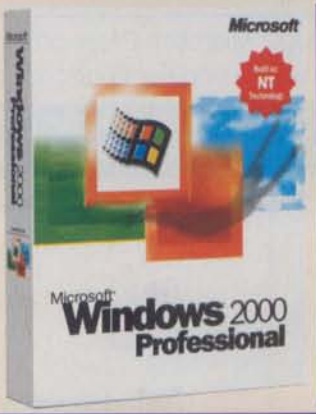
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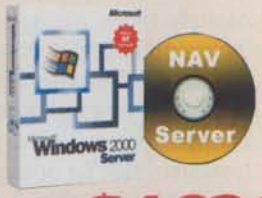
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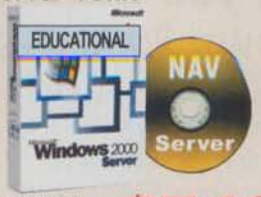
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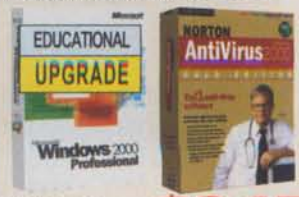
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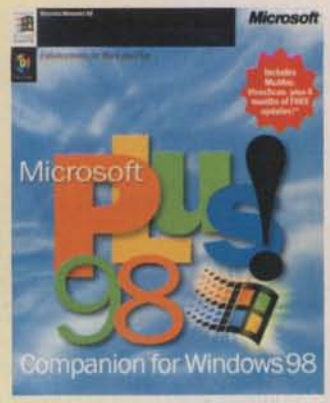
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Powerpoint 2000	✓		✓	✓	✓	✓
Publisher 2000		✓	✓	✓	✓	✓
Small Business Tools		✓	✓	✓	✓	✓
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Everything you wanted to know about MP3, from copyright issues to ripping.

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The Complete Idiot's Guide to MP3: Music on the Internet

While some MP3 books have trouble filling 300 pages with relevant content, this one has a great deal of useful, or at least interesting, information on MP3s. The book is written in an entertaining, informal style, although the authors are not quite as funny as they think they are.

The book starts with a thorough history and background section on MP3s and digital audio. It contains sections on using players on your PC, downloading music from the Internet, portable MP3 players, making your own MP3s and distributing songs through the Internet. There's also a series of profiles of artists from a wide range of musical styles who have chosen to distribute their music using the standard. A track from each artist is available on the CD included with the book.

The sections that cover using MP3 players and downloading MP3s from the Internet are very detailed. Admittedly, it's an idiot's guide, but the book gives the reader very little credit for any previous knowledge of computers. Most readers would probably find the step-by-step instructions for installing each MP3 player excessive.

On the other hand, this level of detail is not present in the sections dealing with recording your own MP3s and distributing them on the Internet. The authors appear to assume that if you're going to go this far, your level of knowledge is quite high.

This book contains some helpful details not seen in other MP3 titles, such as a section on registering copyright for your online works and gaining permission to distribute a cover version of someone else's song.

Josh Mehlman



Authors	Rod Underhill and Nat Gertler
Publisher	Alpha Books/Que
Contact	Pearson Education Australia
Phone	(02) 9454 2200
Price	$29.95
ISBN	0-7897-2036-1
Rating	★★★☆

I Want My MP3!

Spanning 350 pages and 18 chapters, *I Want My MP3* covers everything from downloading an MP3 file from the Internet to installing optimal MP3 hardware in your machine. The author covers basically every type of MP3 utility that you will need, from players and rippers to ID3 editors and normalisers.

The book begins with a quick-start guide to help you get your system ready to play MP3s. Unfamiliar terms are well defined and there are plenty of tips and notes that highlight key concepts scattered throughout every chapter. Some things are explained in agonising detail. For instance, the steps involved when installing the Sonique MP3 player take up nine full pages! Not really necessary, you would have thought.

There is no real humour in the book, but the author does like to state the obvious: "If you don't have speakers or headphones connected to your computer, you're going to have a very hard time listening to MP3s" . . .

Black-and-white images litter the majority of pages, but many are unnecessary. Explaining how to install all the different applications takes much longer than necessary and meaningless screen grabs of installation procedures are a waste of space. It is disappointing that although the Sonique MP3 player is covered in such detail, the other major player, Winamp, gets only one mention.



The author steers well clear of anything concerned with the illegal distribution of MP3s. About a dozen Web sites where readers can easily find legal MP3s to download are discussed. The book also comes with a CD full of MP3 applications as well as a selection of free MP3s.

I Want My MP3 contains plenty of useful information for the less experienced and less technically minded user. However, as with most MP3 titles, there is a lot of padding.

Kieran McNamee

Author	Bill Mann
Publisher	McGraw-Hill
Contact	McGraw-Hill

Guide to ratings

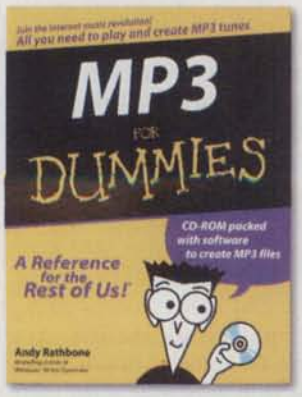
★	Didn't chart
★★	Top 100
★★★	Top 40
★★★★	Top 10
★★★★★	Number one with a bullet

Phone	(02) 9415 9899
Price	$29.95
ISBN	0-07-212290-0
Rating	★★★

MP3 for Dummies

Ever wanted to know how to download MP3s from the Internet? How to create your own MP3s or make your own MP3 CDs? Don't know which portable MP3 player to buy? *MP3 for Dummies* is a beginner's guide to the online music phenomenon. It covers what's legal and what's not, the best players, the best recorders and the best sites for downloading MP3s. There's also a good section on how to compose your own music and use MP3 to distribute it on the Internet.

The content directly related to MP3s is helpful and well written, but there is much that could kindly be described as 'tangential' but would more honestly be called 'space filler'. Why does a book on MP3 need a whole chapter on installing soundcards, hard disk drives and processor upgrades? And is a six-page listing of every single country code used on the Internet really necessary? Is it possible this book was hurriedly thrown together in order to cash in on the MP3 craze?



In a field as contentious as MP3, it's difficult to write a guidebook without taking sides, particularly when tackling the thorny issue of copyright. The Recording Industry Association of America (RIAA) has been a longstanding critic of MP3 and has sued companies such as Diamond (which produces the Rio MP3 player) and mp3.com (which hosts MP3 files on its Web site). The chapter entitled 'Ten Piracy Myths from the RIAA' is four pages of RIAA propaganda, and this book strictly toes the recording industry line rather than entering into any sort of discussion.

Josh Mehlman

Author	Andy Rathbone
Publisher	IDG Books Worldwide
Contact	Woodslane
Phone	(02) 9970 5111
Price	$29.95
ISBN	0-7645-0585-8
Rating	★☆

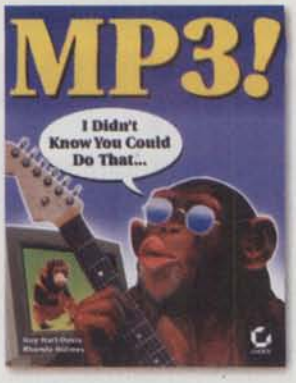
MP3!: I Didn't Know You Could Do That . . .

If the cool monkey on the front cover of this book doesn't make you want to rush out and buy it then maybe the helpful information inside will. Everything you could want to know about MP3s is covered and, refreshingly, no pages are wasted with unnecessary detail. Everything is explained brilliantly and it really is enjoyable to read.

The monkey features on every page and adds a lot of humour to the title. There is some technical jargon to decipher, but having the opportunity to smile, and occasionally chuckle, as you flip through the pages definitely makes the learning process more rewarding.

Quite a number of applications are covered, including the Sonique and Winamp players. The Mac and Linux world is also explored as are the MP3 programs you can use with them. It is also made clear that MP3s are not limited to desktop PCs, and information is provided on how to make use of the technology through portable players and Palm PCs as well as in your car.

Copyright and the illegal distribution of MP3 files are covered clearly, and the book explains how to rip music from your own CDs as well as where to find MP3s that are legally available for download. However, downloading illegal MP3s is not totally ignored, which is at least a realistic view of the situation and genre.

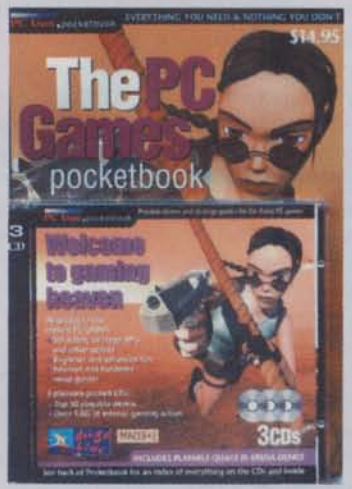


The accompanying CD contains all the programs that are mentioned in the book along with more than 150 MP3 files, which is definitely enough to start your own digital music collection.

Kieran McNamee

Authors	Guy Hart-Davis and Rhonda Holmes
Publisher	Sybex
Contact	Woodslane
Phone	(02) 9970 5111
Price	$34.95
ISBN	0-7821-2653-7
Rating	★★★★

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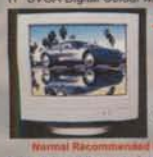
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Perspective

High Tech High Touch: Technology and our Search for Meaning

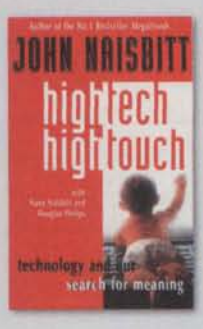
Social forecaster John Naisbitt teamed with his daughter Nana Naisbitt and Douglas Philips to research the concept of High Tech High Touch, a phenomenon he first explored back in 1982 in his seminal work *Megatrends*. *High Tech High Touch*, the authors say, is about "embracing technology that preserves our humanness and rejecting technology that intrudes upon it".

The central theme of the book is that the more technology touches our lives (high tech), the more we want social interaction and a "compensatory human response" (high touch).

The book is based on the premise that we live in a "Technologically Intoxicated Zone" — one where we accept violence as normal, we love technology as a toy, and we live our lives distanced and distracted.

Much of the research for the book is based on over 75 interviews with a range of people, perhaps the most insightful being the discussion with General Norman Schwarzkopf on links between the military and the electronic games industry.

High Tech High Touch covers the topics in depth rather than breadth. The majority of the book focuses on four areas: technology in the community; the impact of violent electronic games (which account for 70% of the US market); ethical concerns about science and emerging genetic technologies; and technology and art.



However, these sections are sometimes disjointed; a telling sign that the book was written by three people. The authors acknowledge that this was exacerbated by them living in different cities. The problem was solved, incidentally, when Nana Naisbitt and Douglas Philips moved to Colorado, the home of John Naisbitt, to finish the book. So much for virtual workgroups!

The section devoted to technology and art comes across as somewhat indulgent. Readers are taken along a circuitous path of over 40 pages that covers the "new specimen art movement" — the role of technology in the artistic portrayal of death, sex and the body. It is an interesting discourse, but the style and content do not complement the rest of the book.

The authors try to present a balanced view of the implications of technology (with the exception of the media violence discussion). They view technology as a necessary constant in life, and present readers with a framework for understanding its unintended consequences. A worthy read, but not John Naisbitt's best book.

Cathie Kennedy

Authors	John Naisbitt with Nana Naisbitt and Douglas Philips
Publisher	Nicholas Brealey Publishing
Contact	Allen & Unwin
Phone	(02) 8425 0100
Price	$35
ISBN	1-85788-255-5
Rating	★★★☆

newmedia.com.au

The media, and particularly new media, changes a lot in six months. Between the time this book was written and when it hit the shelves, there has been the 2UE cash-for-comment scandal, the online content deal between Telstra and the ABC, Telstra's failed bid to acquire OzEmail, eisa's successful bid for OzEmail, and of course, the merger of Time Warner and AOL. Although it could be argued that book publishing is too slow to keep up with media developments, *newmedia.com.au* does provide a useful framework for understanding the contemporary media environment.



newmedia.com.au is a somewhat misleading title. The author, Trevor Barr, devotes the early part of the book to the history of media ownership in Australia and its domination by the Fairfax, Packer and Murdoch families. He also describes the development of Australia's telecommunications network.

He then discusses how the distinctions between media companies, IT companies and telecommunications companies are blurring. This process, Barr argues, began when pay TV was introduced, leading to the formation of alliances between Telstra (a telco) and Fox (a media company), and later PBL (another media company) to form Foxtel. The Internet has increased the pace of convergence, leading to alliances such as ninemsn, a joint venture between PBL's ecorp and Microsoft (an IT company). Both major telcos, Optus and Telstra, now provide Internet access over their television cable infrastructure.

Barr doubts that the emergence of new media necessarily leads means the death of 'old media', and shows how books, newspapers, radio, cinema, television, home video and the Internet all happily coexist. However, the emergence of new media can affect the revenue streams and structure of old media companies. It has been widely predicted, for example, that Fairfax will lose its 'rivers of gold' — classified advertising — to online classified services, which are cheaper and easier to use. Fairfax has responded by establishing an online arm, f2, which has created employment, real estate and automotive Web sites with an eye to holding onto that revenue.

In *newmedia.com.au*, Barr trawls through financial reports on media companies and government policy statements, while keeping an eye on the big picture: the kind of society which is being created by new media. The book concludes with Barr's manifesto for thinking about media, which promotes competition and affordable access for all, so that Australia will continue its development as a social democracy.

Glenn Phillips

Author	Trevor Barr
Publisher	Allen & Unwin
Contact	Allen & Unwin
Phone	(02) 8425 0100
Price	$24.95
ISBN	1-86508-049-7
Rating	★★★★

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Ixla Photo Easy Deluxe

Photo Easy is a collection of six digital photography programs: Ixla Explorer (the 'control centre'), Photo Fix, Photo Fun, Photo Maker, Photo Frame and Photo Publisher. The Deluxe program also comes with The Digital SuperPro 640 camera.

The package includes detailed manuals for both the camera and the software, together with pop-up help, a tutorial and an infinite amount of online help — not that you'll need it. Once you've taken your shots, you simply plug the camera into the PC using either the USB or serial cables provided, and you're ready to start using the software.

I had my photos downloaded and enhanced within minutes. Some quick clicking will have you distorting, framing and emailing your photos in no time.

Having said that, the photo quality is very poor. You might be better off putting the extra $110 towards a good camera, and buying the standard version of the software.

Lindsay Hayman

Publisher	Ixla
Contact	Ixla
Phone	(03) 9803 1600
Price	$199
Requires	Pentium, Windows 95/NT 4.0, 16M RAM, 150M hard disk space, CD-ROM drive
Rating	★★★★

interNetProfit.com.au

It sounds like a Web site, and there is a companion site with that URL, but interNetProfit.com.au is a CD-ROM-based seminar with an accompanying 68-page booklet. As the presenter observes, it isn't a get-rich-quick program, but a description of ways of using the Internet to increase the profitability of an existing small business.



The program presents a narration with one static screen of notes for each of the 14 sections. A professional voice-over would have made for easier listening, but this is a budget product for a relatively small market. You can't pause or rewind the audio, which is irritating when the phone rings or if you want to review a particular passage. You cannot return to a previous section without restarting the program, or jump straight to a particular point in the narration either.

Although the package is presented as software, one could argue that the CD is an add-on to the booklet. Given the software's lack of interactivity, the content could be better delivered on an audio CD.

The focus is on the use of email and Web sites as communication tools. Topics covered include reducing labour, material and overhead costs, improving cashflow and database marketing.

The advice seems sound, and should help small businesses make good use of the Internet's potential.

Stephen Withers

Publisher	AussieWeb
Contact	Manaccom
Phone	(07) 3870 4900
Price	$49.95
Requires	Windows, CD-ROM drive, soundcard
Rating	★★★

Trans-Con

Trans-Con is really two games in one. The main component is a simulation of the building of the transcontinental railway in the US. This follows standard practice in economic simulators; you have a budget for each section and you must make trade-offs between the most direct routes and the ease of the terrain. Different types of bridges suit different river and canyon crossings, and you can blast and tunnel your way through mountains. Various other factors are thrown in, such as interaction with settlers, native Americans and wildlife. Random events such as cave-ins add to the difficulty.



You have the choice of controlling the Union Pacific or Central Pacific railroads, and the line that reaches Promontory, Utah, is the winner.

The narrative is extended with a Carmen Sandiego-style puzzle. The goal is to discover the mastermind behind attempts to sabotage your railroad. Clues as to the identity of the ne'er-do-well are obtained by interrogating the outlaws who the culprit hired to do the dirty work. However, you can't question them until they've been captured, and this means successfully completing mini adventure-style puzzles.

These are quite pedestrian, and involve talking to the characters in the scene to obtain clues and performing actions in a particular order. Children will either enjoy this part — especially where trains have to be shunted around — or become frustrated and resort to the help screen. However, this gives away the entire solution rather than revealing only the next step. Once all the outlaws are captured and interrogated, a straightforward application of logic reveals the mastermind's identity.

Trans-Con is a pleasant game, but of little relevance to most Australian children.

Stephen Withers

Publisher	Knowledge Adventure
Contact	Dataflow
Phone	(02) 9417 9700
Price	$69.95
Requires	Pentium 90, Windows 95, 16M RAM, 50M hard disk space, 4x CD-ROM drive
Rating	★★★

Conquer strange lands, slay Dracula and get behind enemy lines.

Beat 'em, bite 'em, boot 'em

Spec Ops II: US Army Green Berets

Spec Ops II: US Army Green Berets is the long-awaited successor to 1998's Spec Ops: Rangers Lead the Way, a game whose original style defined a new genre featuring realistic first-person combat simulations.

With Spec Ops II, Zombie has switched to using the LithTech engine, which drives Shogo: Mobile Armour Division, and the results are impressive. Shadows, interactive terrain (try not to leave footprints), binocular modes, night vision and infrared views through either a first-person or third-person perspective means a hefty video card is required. *APC* found the game rendered brilliantly using DirectX 6.1 and a TNT2 video card with 16M of RAM on a Pentium III, though a system with a 3dfx card could probably get away with much less hardware.

The game is just as much fun as Spec Ops, once you get used to the whole control method. The playing experience is much more than just using the keyboard and mouse; you must get familiar with controlling the other three soldiers who make up each team throughout the mission, and understand that they use different tactics depending on their equipment.

As in Spec Ops before it, the AI controlling the other members of the team isn't the smartest; switching players often results in a man left for 10 minutes crawling into a cliff base, and his inability to keep up with the pace could jeopardise the entire mission. As long as this is treated as a limitation, it can be worked around easily — switching between the squad members and positioning them is integral to playing this game well. Running straight at the enemy doesn't work. Make sure to scan the stunning terrains with binoculars before positioning the squad for an assault. Keep low, go slow and use tactics. It's a combat simulation, not a shoot 'em up.

Ari Weisz-Koves



Contact	Jack of All Games
Phone	(02) 9482 3455
Online	http://www.specops2.com/
Price	$89.95
Requires	Pentium 200, 32M RAM, 4x CD-ROM drive, 8M Direct 3D video card
Classification	M(15+)
Rating	★★★★

Dracula: Resurrection

Now that the adventure game genre has become stale and unpopular, developers have sought to find a new direction, hoping to appeal to bigger audiences. Games such as Grim Fandango and Monkey Island 3 have been great successes, breaking away from the tedious puzzles and lack of freedom found in more traditional adventure games. However, Dracula: Resurrection offers little inspiration, and takes us back to the drab days of the original Return to Zork series.

Set as a sequel to Bram Stoker's famous 1897 novel, the opening sequence cinematically plays out the novel's conclusion. In the game you take on the role of Jonathan Harker, the star of the original novel. Jonathan must once again return to Transylvania to search for his fiancée, who has been overcome by irresistible urges to seek out Dracula.

The inhabitants and surroundings of Transylvania are represented in glorious 3D, despite the absence of 3D acceleration. The detail on the characters' faces is astounding; every wrinkle and expression is conveyed realistically. The frequent use of spectacular animation sequences further adds to the already superb graphics.

Sadly, amazing graphics and a mediocre plot do not make a great game. Despite utilising a first-person perspective, movement is restricted to clicking on available areas. This completely ruins any sense of immersion and freedom, and such a method of control is very outdated. Inventory items can also only be used when the cursor indicates so, which spoils any sense of excitement when trying your igneous combinations. For a puzzle-based game, the problems are not very challenging and the tasks often involve simply pressing buttons or pulling levers.



Lacking freedom of movement, any sense of immersion and real challenges, Dracula: Resurrection is unsuitable for casual gamers. However, hardcore adventure gamers who found games such as Myst enjoyable may find Dracula's puzzles entertaining, and the beautiful cutscenes are rewarding in themselves.

Alan Crawford

Contact	Jack of All Games
Phone	(02) 9482 3455
Online	http://www.draculagame.com/
Price	$69.95
Requires	Pentium 200, 32M RAM, 4x CD-ROM drive
Classification	MA(15+)
Rating	★★☆

After Hours holiday competition winner

Congratulations to Steve Schulz of Blackburn South, Vic, who wins three Sony PlayStation games — Centipede, Pong and The Next Tetris, plus an Atari T-shirt — for his confession that Elevator Action is the classic game of yesteryear that he'd like to see updated.

Age of Wonders

If you play a lot of turn-based strategy games, you probably don't buy a lot of games every year, but every game you do buy you want to be able to play for a long, long time. That's the beauty of a Warlords or a Master of Magic — they have more replay value packed into one little box than all the flash-in-the-pan bestsellers.

I mention those old games because Age of Wonders borrows (or steals, if you prefer) from these old games left and right. However, since we can count the number of good, turn-based fantasy strategy games on one hand, having a new one that reworks the best elements of each and carefully blends them together can only be a good thing. And this is not a clone; there are enough differences in Age of Wonders to make it stand on its own.

The game comes with one full campaign, which you can play as either Good or Evil, and for once, the backstory isn't a lame take-off of Tolkien. Instead, you're treated to a rather interesting tale of how humans first came to this land, caused a rift among the elves, and eventually threw the whole continent into chaos.

When you finish the campaign, there are plenty of standalone scenarios to whittle away the hours, as well as a fully featured editor that — even if you never use it yourself — guarantees that other fans out there are creating plenty of new scenarios for you to fool around with in the months to come.

The best elements from older games are something you'll encounter again and again in Age of Wonders. You'll know how something works, because it's just how it was in other titles. It also means that the rules that are borrowed make sense from the start, and a lot of time has obviously been spent working the different bits and pieces together so that everything runs smoothly.

If turn-based strategy games with a fantasy theme do it for you, then this is an extremely well-balanced game.

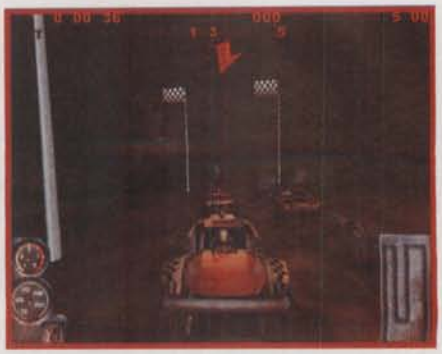
Ryan Shaw



Contact	Jack of All Games
Phone	(02) 9482 3455
Online	http://www.ageofwonders.com/
Price	$89.95
Requires	Pentium166, 32M RAM, 350M hard disk space, 4x CD-ROM drive, 1M video card, DirectX 6
Classification	M(15+)
Rating	★★★☆

Speed Demons

I have to say, this is a pretty awful game. There really isn't any other way to describe it and one wonders what possessed Microids, the developer, to consider it worthy of release. The problems with the game affect almost all aspects of what a racing game is about.



First, the gameplay. This consists solely of racing Mad Max-style vehicles around a small selection of poorly designed tracks. There are arcade, challenge and championship modes available, all of which are equally banal. A multiplayer option is also provided, although it is unlikely that you will be able to find anyone else masochistic enough to endure the game.

The physics are dreadful. Some cars have a supernatural ability to stick to the ground (even on loose dirt and ice), and all

Games News

● Sid Meier has one of the most recognisable names in the games industry, and although nobody is suggesting that this is undeserved, he has tended to overshadow some of his equally brilliant co-developers. Brian Reynolds worked at Firaxis on the development of Alpha Centauri and was also the lead designer on Civilisation II — not a bad résumé for a games developer. And it looks like he might be needing one now, because he's departed Meier's Firaxis studios just as it's beginning to ramp up on the development of Civ III (with Hasbro) and Meier's dinosaur game. So what's the inside story? Infighting? Design differences? Well, nobody's talking at the moment, least of all Sid himself. All he's publicly said thus far is that "Brian is a talented designer and we wish him well." You can bet that you'll be hearing more about this in the near future.

● Few things are certain in life, and even fewer in the arena of computer games. One thing you would have happily bet your last dollar on is that someone would eventually create Massively Multiplayer Online RPGs (MMORPGs) for both Star Wars and Star Trek. And yes (surprise, surprise), it's come true. Activision has announced that it is in the planning stages for a Star Trek MMORPG with Verant Interactive, expected to release sometime in 2002. Verant has really caught the MMORPG bug; it's already developing a game called Sovereign and the rumours are becoming louder and louder that Verant is talking with Lucas Arts about developing a third MMORPG. Hmm, wonder what that could be?

● Finally, you've heard about the Australian development company that's currently working on the next iteration of Interplay and Black Isle's Fallout series, haven't you? Yep, Aussie developer Microforte is working on a number of games (including another MMORPG), but the big one, at least in terms of pre-publicity, has to be Fallout Tactics (working title only). It's still early days, but we'll keep our eye on the project and let you know more as it comes to hand. The game will not be Fallout 3 however, just situated in the Fallout universe, and possibly played from a first-person perspective.

● Interplay has just licensed Monolith's LithTech engine, though it won't say what game it will be for . . .

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of them are able to fly hundreds of metres through the air after hitting a roadside obstacle. There is some very rudimentary damage modelling, to the extent that you might lose a wheel or two after a collision, although this doesn't seem to noticeably affect your driving ability.

Just to complete the horrors, the graphics are extremely blocky, even on the highest resolution settings, the sound is weak and the interface is a model of counter-intuition. On top of this, the game is unstable.

Sometimes, a game is deficient in one area, but is redeemed by a compelling story-line which keeps you soldiering on. Not here. There is a complete absence of any plot that might have glued this mess together. The flimsy booklet which is packaged with the game gives little more than basic installation instructions and a description of the controls.

Fortunately, these are straightforward and so it takes very little time to figure out that this is a game that is simply not worth playing.

Jon Gill

Contact	Jack of All Games
Phone	(02) 9482 3455
Online	http://www.microids.com/
Price	$69.95
Requires	Pentium II 200, Windows 95/98, 64M RAM, 4x CD-ROM, 4M video card, DirectX 6
Classification	G
Rating	★

Spirit of Speed 1937

Today, Formula One racing attracts exorbitant amounts of money, slick advertising campaigns and the latest and greatest technology. Classic Grand Prix racing takes you back to the 1930s, when only the bravest and most skilful drivers competed. Without seatbelts or helmets, great names such us Louis Chiron and Rudolf Caracciola risked all to win, struggling to control their enormous eight to 16-cylinder cars, and hampered by small tyres and no suspension.



Spirit of Speed 1937 faithfully reproduces the fear and adrenalin felt by these drivers. The monster cars threaten to leave the track at the slightest provocation, and such edge-of-the-seat driving is pure exhilaration.

Making life even more difficult are the tracks and dirt circuits that are a far cry from the smooth asphalt of today. Banked corners make frequent appearances, and there are no gravel pits or barriers to slow you down. The graphics are spectacular and 3D acceleration ensures all tracks are represented beautifully, together with lush scenery. Sound quality is decent, and roaring engines and screaming crowds add greatly to the realism.

All tracks are fun to drive, as are the cars, but one combination in particular shines through. Driving the 24-litre, 16-cylinder Napier Railton at the legendary Brooklands track is a pure test of nerves. The oval circuit consists of four heavily banked corners and straights. The track was designed purely for breaking speed records. You gain great insight into what racing is all about when screaming down the main straight at 168mph, your car shaking and shuddering beneath you.

Spirit of Speed 1937 takes you back to an era when racing was far more dangerous and out of control. This game is a must-have for all racing aficionados and casual fans alike.

Alan Crawford

Contact	Dataflow
Phone	(02) 9953 8788
Online	http://www.spiritofspeed1937.com/
Price	$89.95
Requires	Pentium II 200, 32M RAM, 4x CD-ROM, DirectX 7 video card
Classification	G
Rating	★★★★

Football World Manager 2000

Managing a soccer team is a challenging occupation, as can be testified to by the ranks of ex-managers, and Football World Manager 2000 gives some insight into the experience.

You have the job of running any one of over 1,400 clubs in more than 70 countries (including Australia, although some of the NSL details aren't quite right).

As the manager, you must select the



team, choose training strategies for the whole team and individual players to build skills and fitness, set formations and tactics, develop a youth squad and play the transfer market — with the help of your support staff of assistants, scouts and a physiotherapist.

During matches — 'live' highlights are shown in a small but adequate pane — you can attempt to motivate your players by calling to them, nominate the penalty taker, substitute players, and change formations and tactics.

You must also keep an eye on your club's finances so you know you have enough money before developing the stadium or buying players, let alone paying existing players. The more successful the club, the bigger the income from the gate, sponsorships, merchandising and so on.

A Windows Explorer-style interface allows you to see what's happening at different clubs around the world, which helps you prepare for matches and seek out up-and-coming players.

The software is reasonably quick to process the week's events, and allows up to eight human managers. Time isn't critical in most situations, but when two managers' teams are playing each other the match can be paused at any time to allow either manager to give instructions.

Overall, World Manager is on a par with EA Sports' The F.A. Premier League Football Manager 2000 and they are equally enjoyable. The main difference is that Football Manager's full-screen match animation places higher demands on the hardware.

Daniel and Stephen Withers

Contact	Ubi Soft Entertainment
Phone	(02) 9362 1414
Online	http://www.footballworldmanager.co.uk/
Price	$69.95
Requires	Pentium 133, 32M RAM, 200M hard disk space, 4x CD-ROM drive, 2M DirectX 6-compatible video card
Classification	G
Rating	★★★★

Penguin's playtime

Computer games are no longer just the province of PCs and consoles. **Mike MacCana** explains the key Linux gaming technologies and reviews five of the hottest Linux titles.



Linux has never been the platform of choice for games. A number of commendable open source efforts have always been around, but the infrastructure required to support easy-to-use, fast, friendly 3D games simply hasn't existed. Things change. Linux now has friendly graphical interfaces, plug and play, support for 3D hardware and a number of other attractive features which means there is now an increasing number of good quality games on Linux — both open source and commercial.

OpenGL

First person shooters aren't the only games that use 3D. Support for 3D has become a popular feature of many games outside of this genre, and OpenGL is what provides this technology to Linux. OpenGL is a 3D acceleration technology originally created by Silicon Graphics (now SGI) for high-end 3D workstations. It's also behind most popular 3D games like Quake III and Unreal Tournament. John Carmack, the man behind the Doom and Quake series engines, believes OpenGL to be the only method that can perform 3D on desktop systems (Windows, Linux and Macintosh), and the success and popularity of his games is a testament to that. The most popular version of OpenGL on Linux is known as Mesa. Visit the Mesa site at http://www.mesa3d.org/.

I should be so Loki

The best-known company in Linux gaming is Loki. Loki is responsible for bringing titles like Heavy Gear II, Descent III, and Myth II to the Linux platform. Loki is a games publisher; it signs agreements with companies like Electronic Arts (the makers of Heavy Gear II) to do the work required to port the game to Linux and expose it to Linux users, selling more copies. In return, Loki gets a portion of sales revenue. Loki has a reputation for quality. All its games come with elegant graphical installers, online technical support, patches and updates. Although Loki games are all commercial software, their install programs, MPEG player, the Simple DirectMedia Layer and other technologies are open source. You can find out more about Loki at http://www.lokigames.com/. SDL MPEG Player Library (SMPEG) 0.0.3 and Simple DirectMedia Layer 1.0.6 are on this month's **apcmag.cd**.

The Simple DirectMedia Layer

Windows often uses another 3D technology called Direct3D. It is part of Microsoft's DirectX, a suite of interfaces for different aspects of multimedia. There's Direct3D, DirectDraw, DirectSound and so on. Many Windows games use these interfaces. Linux users are rescued by the Simple DirectMedia Layer (SDL), an open source implementation of the DirectX interfaces for Linux. This makes it much easier for programmers to port Windows DirectX games to Linux. SDL is an open source project started by Loki (see left).

XFree86 and games

X is the network graphics protocol used by Linux. X not only allows Linux programs to show themselves onscreen, it allows users to display programs running on remote computers, using a special language known as the *X protocol*. The X protocol is a very cool feature, but slows down showing things onscreen because display information has to be converted into the X protocol first.

The program that most often provides X on Linux is called XFree86, and the most current version is XFree86 3.3.6. XFree86 4.0 is in development and contains a number of exciting new developments that improve 3D gaming under Linux. These include Direct Rendering Infrastucture, which improves speed by allowing programs to display items onscreen without having to use the X protocol, and 3D in a window — all 3D programs now must run in full-screen mode. Visit http://www.xfree86.org/ for more information. XFree86 Base 3.3.6 is on this month's **apcmag.cd**.

Linux 3D drivers

3dfx Linux drivers
http://linux.3dfx.com/

Matrox Linux drivers
http://www.matrox.com/mga/drivers/3rd_party/home.htm

nVidia beta Linux drivers
http://www.nvidia.com/Products.nsf/htmlmedia/software_drivers.html

ATI Linux information
http://www.ati.com/na/pages/resource_centre/dev_rel/linux.html

To 3D or not to 3D

Most 3D card manufacturers (3dfx, Matrox, nVidia and ATI) now support Linux for their current and upcoming cards, but they have differing strategies. Voodoo3, 3dfx and the Matrox G400 range of cards now work on all current 3D Linux games, but nVidia, TNT2, GeForce and ATI owners will have to wait some months until the release of XFree86 4.0 to be able to play 3D games. All of these cards currently support 2D gaming.

Stop playing with yourself

Although gaming on Linux is a fairly new concept, it's taking off in a big way. Your local Linux users group (LUG) might have a games group. You can find more information online at Linux Games (http://www.linuxgames.com/) and The Linux Game Tome (http://www.happypeguin.org/).

Mike MacCana can be contacted at mikem@cyber.com.au.

Game reviews

Quake III Arena



id Software has long been the champion of 3D games. This cutting-edge 3D game pits you against highly intelligent, artificial robots and other human players in a multiplayer, arena-style tournament. The levels are detailed and unusual, and the computer-controlled players have unique personalities, abilities and appearances.

Author	id Software
Publisher	Loki
Online	http://www.quake3arena.com/
Price	$89.95
Licence	Commercial
Requires	Pentium 233 with 8M video card, or Pentium II 266 or AMD-K6 350 MHz with 4M video card; Linux kernel 2.2.9, GNU C Libraries (glibc) 2.0; 64M RAM; 4x CD-ROM drive; OSS-compatible soundcard; 20 to 480M hard disk space; 3D card supported by Linux (see 'To 3D or not to 3D' on page 195)
Classification	MA(15+)
Rating	★★★★★



Unreal Tournament

Epic's 3D shooter might not be as visually stunning as its id Software counterpart, but it more than makes up for this in gameplay. Levels are large and expansive, and in addition to vanilla deathmatch and 'capture the flag' modes, Unreal Tournament provides group mission levels. GT Interactive did not see fit to publish a Linux version or include the Linux files on the Windows CD. To play the full game, you must purchase the Windows version and download the Linux files from Epic. The game exhibits some



segmentation faults when played on certain Linux distributions. Look for an update to address these problems shortly.

Author	Epic Megagames
Publisher	GT Interactive
Online	http://www.unrealtounament.net/
Price	$89.95
Licence	Commercial
Requires	Linux 2.2 kernel
Classification	MA(15+)
Rating	★★☆

Civilization: Call to Power

For those less bloodily inclined, Civilization: Call to Power may be your game of choice. A turn-based strategy game, it allows you to build a society over a period stretching from the stone age to a space-age future. Players master technological development, diplomacy and war, found new cities, exploit natural resources, and play politics. Truly engrossing, this is a game you will want to play as much for the immersive experience as to win.

Author	Activision
Publisher	Loki



Online	http://www.lokigames.com/
Price	$79.95
Licence	Commercial
Requires	Pentium 133 or PowerPC 133; Linux kernel 2.0, GNU C Libraries (glibc) 2; 4x CD-ROM drive; 32M RAM; 80M swap; 400M hard disk space; X Window System; 16-bit colour; OSS-compatible soundcard
Classification	G(8+)
Rating	★★★☆

Myth II: SoulBlighter

Myth II combines a very elegant 3D engine with the real time strategy games you have come to love. Steeped in the surrounds of medieval fantasy, you control armies of



mythical creatures that battle against the evil SoulBlighter in glorious Mesa 3D. The game can be played in single-player mode or against others over a network. Swords and sorcery at their finest.

Author	Bungee
Publisher	Loki
Online	http://www.lokigames.com/
Price	$89.95
Licence	Commercial

Requires Pentium 133 or PowerPC 601 120MHz; Linux kernel 2.0, GNU C Libraries (glibc) 2; 4x CD-ROM drive; 32M RAM; 80M swap; 100M hard disk space; XFree86 3.3.x; 16-bit video card; OSS-compatible soundcard

Classification MA(15+)

Rating ★★★★

StarCraft (and Wine)

Wine, the reverse-engineered Windows implementation for Linux, is now capable of running some Windows games such as StarCraft quite well. In this real time strategy game, you are the commander-in-chief and manage resources, units and structures in the interest of one of three alien races, in a bid to control the planets. The story-line, characters, and excellent full-motion scenes definitely make this game worth the small amount of configuration necessary to run it. Read the Linux-StarCraft HOWTO for more details on configuring Wine for this game.

Author Starcraft by Blizzard; Wine by the Wine team

Publisher Blizzard Entertainment; the Wine team

Online http://www.linuxgames.com/starcraft.shtml





Price $89.95

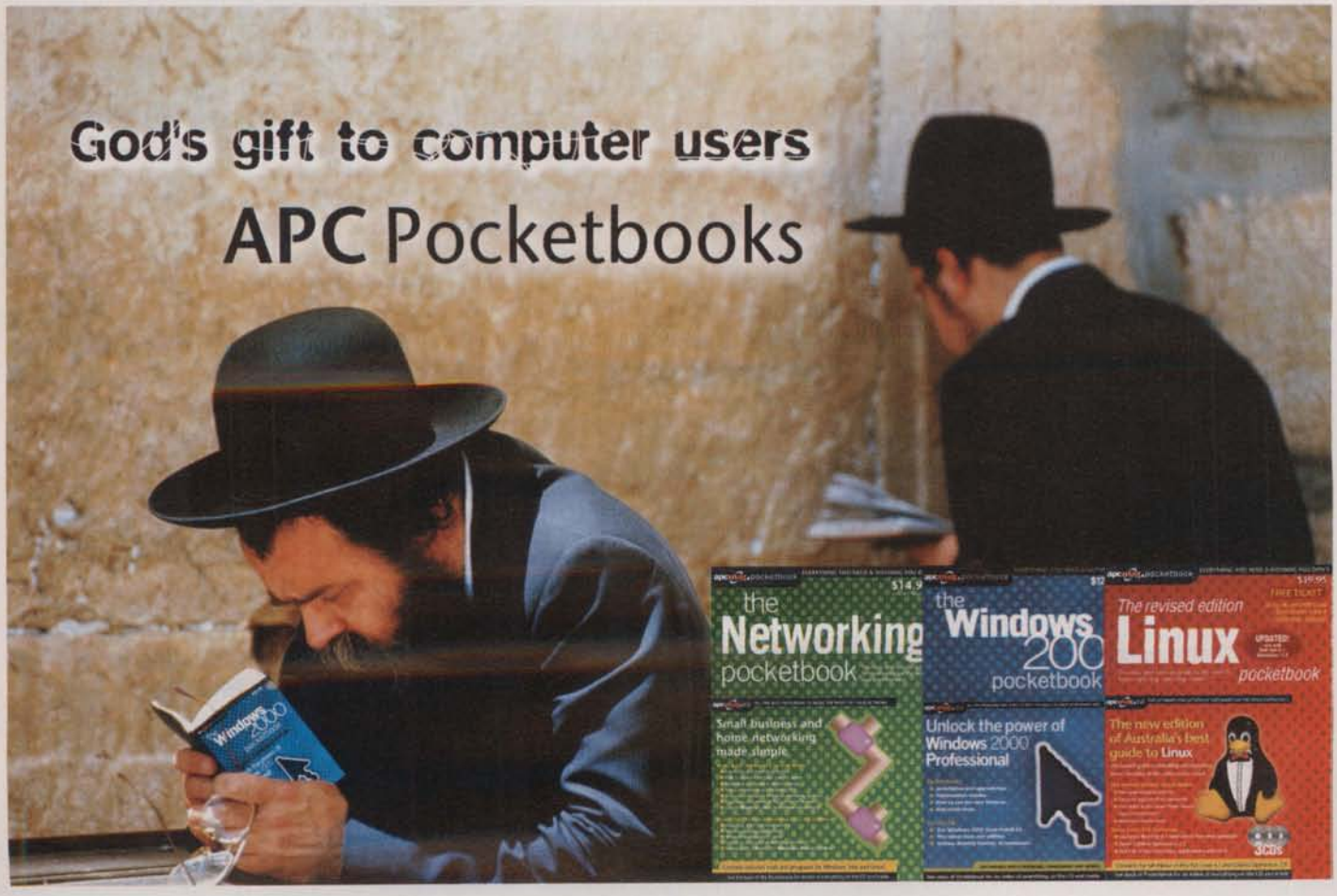
Licence Commercial; Wine is GNU public licence

Requires Pentium 90; Linux 2.2 kernel; Wine; 16M RAM; an X server set to 256-colours, 640 by 480

Classification M(15+)

Rating ★★★★☆

Demo versions of all these games can be found on this month's apcmag.cd



If you're no angel, check out these April Fools' sites.

Fools rush in

Best Pranks and Practical Jokes on the Web

Welcome to Best Pranks and Practical Jokes on the Web — home of Crank Call Central, the Fart Machine, Fake Memo, and The Avenger.

Don't expect anything fancy on this portal site, as pranking is its name and simplicity is its game. Essentially, Best Pranks is a list of some 80 Web pages, a search engine and a handful of humorous links thrown onto a plain black page. The links are divided into three categories: pranks, practical jokes and computer pranks, including several of the other sites reviewed in this month's Web File.

The list is far too extensive to cover in its entirety — it would literally take you until next April Fools' Day to explore all the sites. The simple search facility might be the go if you're looking for something specific or you want to cut down on surf time. Here's a taste of what's on offer . . .

Master the art of prank calls at Crank Call Central (http://cranks.virtualave.net/). Sadly, this appears to be one of the most popular prankster pastimes. What you'll find is audio files containing annoying, obnoxious or obscene (many are R-rated) prank calls. Their advice? "Don't become another victim."

An oldie but a goodie is the Fart Machine program, available as a free download (http://www.wavhounds.com/fart/index.html). Try out the Super Deluxe Edition, or for those with a fetish for flatulence there's the Anarchy Edition.

For some office mayhem, send your colleagues a Fake Memo (http://www.activegrams.com/series/memos.html) accusing them of an interoffice affair, or for abusing phone, photocopier or Internet privileges. The only problem is that the memos are written for US workplaces, which limits their use. They're still good gag value, but they're not as much fun if you can't pass them around the office.



If I had to pick a favourite, it would be Swift Vengeance (http://www.ekran.no/html/revenge/). This page is dedicated to helping "those who have been victimized or wronged in any way" to get even using various revenge schemes, tactics and ideas. Among them is a tome called The Avenger's Handbook, which contains mafia-style revenge methods (try these at your own risk).

In short, Best Pranks has more gags, pranks and hoaxes than you could pull off in a lifetime. It's highly recommended for both the annual April Fools' jokester or the serial prankster.

Vanessa Fazzino

Online http://www.startingpage.com/html/jokes_pranks_practical_jokes.html

Rating ★★★★

AprilFools.com

AprilFools.com is devoted to hoaxes and pranks to fool your friends with on April Fools' Day, or any other day for that matter.

Hoax news stories will be a favourite; you can create news pages featuring your victim in scandals with the likes of Monica Lewinsky and the Spice Girls, announcing their impending Hollywood stardom or hailing them as the next sports sensation. You can also create bogus Web pages in a similar vein.

Apart from the pranks, you can have fun with faces: find your celebrity dream date; blend your own celebrity (mix Michael Jordan with Bill Gates and get the world's tallest billionaire); take the celebrity face challenge (use identikit face parts to guess the celebrity); and disgruntled offspring can design a dream dad.

Many of the features on this site are actually from the RubberChicken.com Web site (see next review).

Unfortunately, the pranks are so US-centric that it's unlikely that they will catch out your Australian friends (unless



you have extremely gullible friends). When you go to the page that searches for your potential victim's postal address, you discover that Australia is not a search option — funnily enough, Luxembourg is. You are also supposed to be able to locate people's email addresses using this site, but it appears this service is no longer available.

Apart from the free stuff, there are prank services available for a fee: you can go on a virtual holiday and send friends postcards with an authentic postmark from the US holiday mecca of your choice, or you can send fake joke mail (but it is postmarked in the US).

Despite its US bent, there is still plenty of fun to be had on this site, but don't expect to fool too many people.

Gail Lipscombe

Online http://aprilfools.infospace.com/

Rating ★★★

RubberChicken.com

Question: What do you get when you cross Bill Gates with pop singer Prince? Answer: The billionaire formerly known as Geek. *LOL*

If ever you needed a silly excuse for a site, this is it. Surely the Celebrity Blender was enough to convince you of that. But if you need more evidence . . .

Ever wonder what Bill Clinton would look like as a pig? Fancy listening to whoopee cushion sounds called Constipation Station, Hesgonnablow or Tsunami? Then enter the Fun House at RubberChicken.com — at your own risk, of course.

In a similar vein to the Fake Memo service offered by Best Pranks and Practical Jokes on the Web, RubberChicken.com's



FakeMail allows you send prank letters or 'official notices' such as an organ donation request, a memory chip recall or an invalid marriage licence letter.

RubberChicken.com, while scoring points for aesthetics, doesn't really have anything substantial or original to offer — or anything terribly comic for that matter. Nevertheless, if you have an Internet account, a Web browser and are a 'sociocomic' nut, this site may appeal to you.

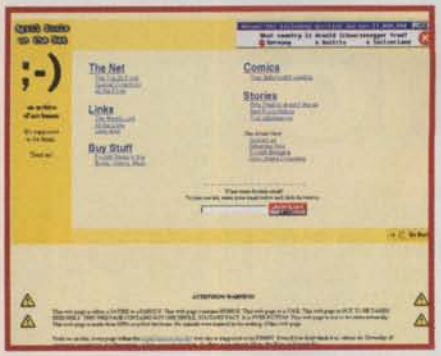
Vanessa Fazzino

Online http://www.rubberchicken.com/

Rating ★★☆

April Fools on the Net

Every year an untold number of Web sites do the whole April Fools' thing. They post a fake story, slap up a bit of made-up gossip and then hope some mayhem ensues. A few even pull it off. However, most are just cheesy — and most of the jokes listed at April Fools on



the Net are no exception. Even the colour of the site smacks of cheese. Visit it and you'll see what I mean.

In any case, April Fools on the Net purports to be a archive of the Net's best humour; it lists a top 20 and has archives sorted by year and by category. Culled from Web sites, Usenet posts and other Internet sources, the stories range from cutting commentary to lame geek advocacy. The fact that two of the categories are Microsoft and Linux speaks volumes about the calibre of the jokes — there are an awful lot of fizzers and obscure technology jokes padding out the good posts. Either I've had a humorectomy or the owners of the site have, because many of the best April Fools' jokes are buried deep within the site. Be prepared to be patient.

Still, it may be rewarding to soldier on. The cleverest posts are the most believable ones, the ones that have you going right to the end — or they would have, had you come across them in a different context. Other good posts are examples of Onion-style satire (see http://www.theonion.com/), such as "17mm format to replace 16mm format" and "Acorn announces RISCWatch".

Not a lot of design nous went into the development of the site. The purveyors' main talent seems to be a mastery of Ctrl-C and Ctrl-V. It's text heavy, with a very simple design and horrible colours. Not a site to visit if you're deep in hangover territory.

Nathan Taylor

Online http://www.2meta.com/april-fools/

Rating ★★★

Surfbaud: Poisson d'avril

Why is the first day of April celebrated by playing pranks on your family, friends and workmates? Is it the feast day of a patron saint of foolishness? The legacy of an ancient pagan custom? According to the Urban Legends site, which is dedicated to debunking myths such as the KFC genetic engineering story, April Fools' Day began in France in the 16th century. Drawing on a thread from the alt.urban.folklore newsgroup, Urban Legends suggests that when France adopted the Gregorian calendar in 1582, the French stopped the traditional week-long celebration of the new year between March 25 and April 1, and recognised January 1 as the start of the new year. From 1853 onwards, the people who did not know of the date change, or refused to acknowledge it, were teased with false party invitations and given silly gifts on April 1. The fools were referred to as *poisson d'avril* (April fish). Over the years, April Fools' Day then spread to the UK, the US and Australia.

There are few other sites which add more detail to the history of April Fools' Day. Although it does not specifically mention April Fools' Day, the Calendar FAQ states that France did indeed adopt the Gregorian calendar in 1582, and that the new year was indeed celebrated on March 25 (this is about the same time as the vernal equinox and the beginning of the northern spring). The Gregorian calendar was adopted by Pope Gregory to fix some of the miscalculations in the Julian calendar. To correct these errors, the French dropped 10 days from December 1582 — on one day it was December 9, and the next it was December 20. The UK did not officially recognise the Gregorian calendar, or that the year began on January 1, until the 1750s. It all makes the rollover to 2000 seem insignificant.

In the information age, April Fools' Day has become a trigger date for viruses, and of course, hoax virus warnings. On April Fools' Day last year, the Linux community spread a hoax virus warning about Tuxissa, a variant of Melissa which downloads and installs Linux onto affected Windows machines. It was an obvious hoax, but Linux users forwarded the email to each other with glee. The virus warning originated as a satirical news story on the Linux humour site Humorix. Now that January 1 and February 29, 2000, have passed with few glitches, we can expect to see the usual viruses and hoax virus warnings on April Fools' Day. If not, we can rely on the old media to run bogus stories about the cancellation of the Olympics, or on school children to play the classic 'shoes untied' and 'kick me' jokes on each other. Happy April Fools'.

Glenn Phillips

- **Urban Legends**
 http://www.urbanlegends.com/
- **The Calendar FAQ**
 http://www.tondering.dk/claus/calendar.html
- **Humorix**
 http://i-want-a-website.com/about-linux/

Grab some dice and join in the excitement of founding your own dot com business!

Chip Chat: The IPO game



Chip Chat would like to remind players that greed is not always good. If you enjoyed this game, please send a donation.













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